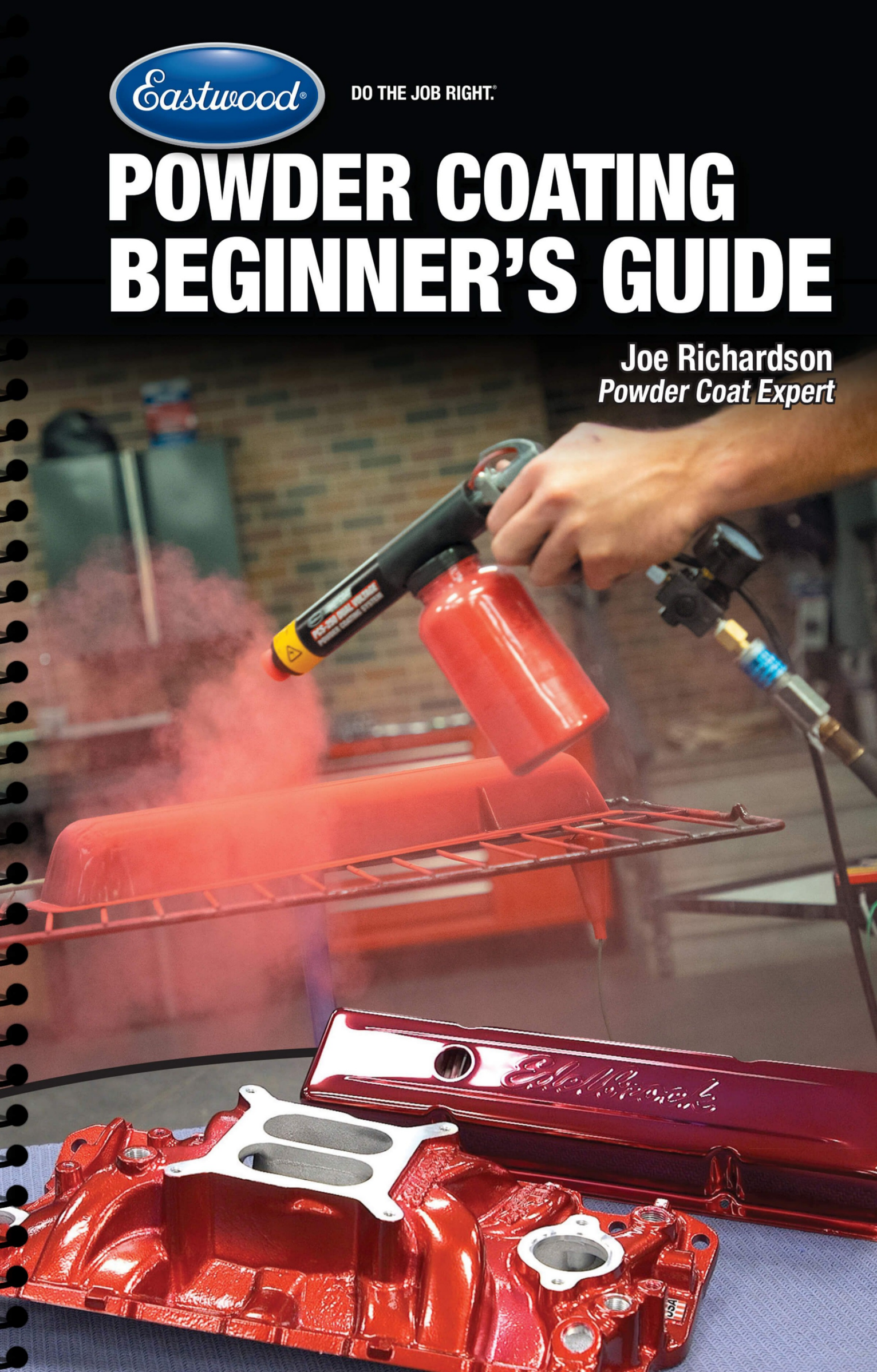
Eastwood®

DO THE JOB RIGHT.®

POWDER COATING BEGINNER'S GUIDE

Joe Richardson
Powder Coat Expert



© Copyright 2022 Easthill Group, Inc.

Powder Coating Beginner's Guide

By Joe Richardson

CONTENTS

INTRODUCTION

1. WHAT IS POWDER COATING AND HOW DOES IT WORK?.....Pg 5

2. SAFETY AND WARNINGS .....Pg 11

3. WHAT IS NEEDED TO BEGIN POWDER COATING? ..... Pg 13

4. PREPARING OBJECTS FOR POWDER COATING ..... Pg 20
   - 4a – Cleaning, stripping and prepping parts.
   - 4b - Masking Surfaces.
   - 4c - Using filler under powder coat.

5. HANGING AND SUPPORTING OBJECTS FOR POWDER COATING..... Pg 25
   - 5a – Hanging lighter, smaller items.
   - 5b - Supporting heavy objects.

6. APPLYING THE POWDER TO PARTS ..... Pg 28

7. ADVANCED POWDER COATING TECHNIQUES ..... Pg 31

8. PROBLEMS, CAUSES AND SOLUTIONS..... Pg 45
   - 8a. The Most Common Problems That Occur During Powder Application.
   - 8b. Flaws in The Cured Finish.

9. FREQUENTLY ASKED QUESTIONS.....Pg 54

10. ADVANCED EQUIPMENT NEEDED TO GO TO THE NEXT LEVEL .....Pg 59

11. GLOSSARY OF POWDERCOATING TERMINOLOGY .....Pg 64

12. MISCELLANEOUS ITEMS FOR IMPROVED POWDERCOATING .....Pg 66

INTRODUCTION

This book is a compilation of my 20+ years of experience developing powder coating equipment and products both at the in-house research and development facilities of The Eastwood Company in Pottstown, PA. and with my own numerous, household, hobby and automotive restoration projects.

Over this time, I've gained extensive hands-on experience with everything from high-end and costly professional powder gun systems to the time-tested and proven Eastwood PCS-150 Single Voltage Powder Coating System® (Eastwood #33272) and the Eastwood PCS-250 Dual-Voltage Powder Coating System® (Eastwood #33728).

Proper recognition should also extend to the Powder Coating Institute www.powdercoating.org for their excellent workshop series *Powder Coating 101* and *Powder Coating 202* which I attended in 2002. These should be considered a must for anyone planning to enter powdercoating as a primary business.

In addition, I have previously shared my knowledge and experience, assisting many first-time and novice powder coaters by providing advice and solutions to problems often encountered along the way.

Thank you to Liesel Kirlin and Nick Flocco for their superb editing skills.

Finally, with the goal of providing the most accurate and correct information possible, several established and respected powder coating professionals, Dan Woods of D&W Motorsports Custom Powder Coating and Bob Zarrilli of RiMZCoat Powder Coating & Media Blast Specialists have been consulted during the creation of this book to assure the absolute best results for you, the reader. Have fun!

Thank you,
Joe Richardson

PROVEN RELIABILITY

As an excellent example of the proven durability and superiority of powdercoat over painting, all the metal components in the restoration shown in the above photos were powdercoated by the author nearly 20 years ago and still look as good as the day they were done!

1. WHAT IS POWDER COATING & HOW DOES IT WORK?

To fully appreciate the advantages powder coating offers over other methods of coating objects especially spray painting, a working knowledge of how powder coating works is extremely helpful.

Powder coating is the process of applying an extremely durable, protective, and attractive plastic film over metal parts, using an electrical charge and compressed air, then melting and baking it permanently in place with heat and chemical conversion.

This brief description may seem oversimplified, but this process will be explained in greater detail in this book. We will also cover what to do, how to do it, and what NOT to do to achieve a perfect powder coated finish every time.

The "Powder"

Powder coat powder is a plastic material formulated using specific resins, coloring pigments and other chemical compounds. These compounds include heat-activated cross-linking polymers, bonding adhesives and curing agents to provide a tough, abrasion and chip resistant finish.

In manufacturing, powder batches start out as thick molasses-like liquids that are extruded into sheets, chilled, and then ground into a fine powder. However, not all powder coating powder is created equal. There are numerous powder formulations which are specially designed to have certain properties to perform a specific job.

Some of these properties are surface texture, gloss level, final finish appearance, UV resistance, abrasion resistance, chemical resistance, the ability to withstand heat, and many more. Eastwood HotCoat powders, depending on color, are generally a polyester, epoxy or urethane formulation. All offer excellent UV, abrasion, chemical, impact, heat and weather resistance.

While these specific physical properties can be found in products from other suppliers, every formulation Eastwood offers is made from 100% virgin materials, carefully selected to be of the highest quality for maximum performance, great appearance, and long-lasting protection. Be very selective when choosing powder as many on the market contain fillers or reclaimed powder.

To fully provide an understanding of the benefits of Powder Coating, it is vitally important to explain the difference between thermoset and thermoplastic materials. Common injection-molded plastic items which can be re-melted by heating are examples of thermoplastic materials. All Eastwood powder coat formulas are of the thermoset type, which means that these powders require specific heat exposure and time intervals to trigger an irreversible chemical cure which bonds the powders to metallic objects. Once cured, the film is permanently set and cannot be re-melted.

To provide an example:

If one were to place a plastic fork in an oven at 250°F +/-, in a very short time the fork will melt and deform. When it cools, the plastic will regain the physical properties it had before it melted. This process of melt and solidify can be repeated until eventually the material degrades. This is an example of a thermoplastic material.

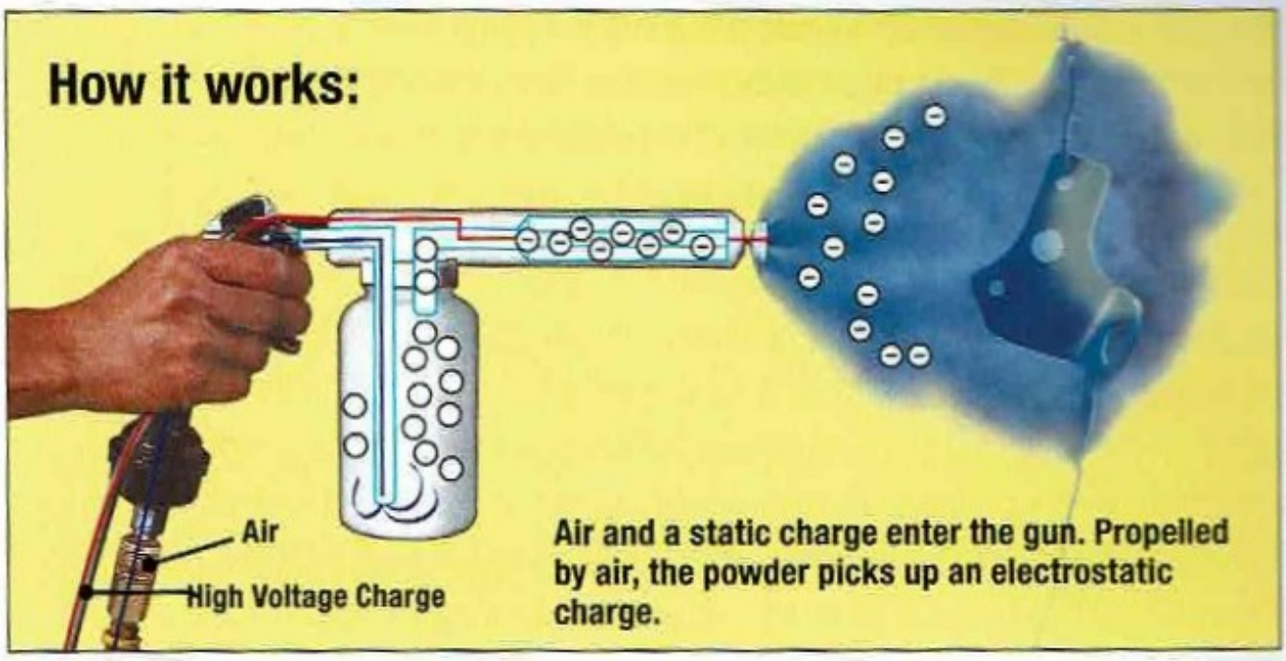
If a powder coated and cured part is put into the same oven at 250°F +/-, nothing will happen. If the temperature is increased to force the plastic coating to melt, it will char or burn, but it will not melt. This behavior is typical of thermoset plastics.

As a result of the well-known success and durability of powder coating, virtually all lawn furniture, bicycle frames, trailer hitches, wheels, lawn and garden equipment, marine equipment, gas pumps, architectural railings, lamp posts and many more everyday items are made with powder coated finishes. In fact, in manufacturing, powder coating has almost universally replaced traditional spray painting as the coating method of choice. This is, of course, because of superior durability, but also because it is much safer for the environment as it has no solvents that produce hazardous emissions and clean-up is quick and easy requiring no hazardous solvents. The application gun itself can be cleaned out easily with only compressed air, allowing fast color changes.

The powder is applied to the parts using a specially designed powder coating gun that relies on a minimal amount of compressed air to fluidize or mix the powder with air, causing it to behave as though it were a vapor being propelled out of the gun. As the fluidized powder leaves the gun, it passes over an electrically charged metal rod known as the emitter rod which when electrified, is surrounded by a high voltage corona.

While flowing over this rod and passing through the corona, the powder particles pick up a high-voltage static electrical charge from the emitter rod. As the highly charged powder particles travel through the air, they are attracted to any metal parts that are attached to the ground lead of the powder coating gun. This is referred to as a corona charge system and the type of powder charging equipment used is known in the industry as a corona gun.

It should also be noted that the friction of the powder particles flowing through the gun will also impart a secondary and lesser static charge known as a tribo charge.


How it works:
Air
High Voltage Charge
Air and a static charge enter the gun. Propelled by air, the powder picks up an electrostatic charge.

The static electrical attraction is how the powder particles can reach inside a part or wrap around the back or interior of objects, actually travelling in a curved path. This is completely unlike traditional sprayed paint which is severely limited in that it only travels in a straight "line-of-sight" path and will only cover what the spray gun or can is aimed at.

Powder is "wrapped" around all sides by static attraction

Line-of-sight coverage only

The static electrical attraction is how the powder particles can reach inside a part or wrap around the back or interior of objects, actually travelling in a curved path. This is completely unlike traditional sprayed paint which is severely limited in that it only travels in a straight "line-of–sight" path and will only cover what the spray gun or can is aimed at.

An extremely important fact to always be aware of is that without a proper and complete ground, the powder will fail to adhere to the part.

Always ensure proper grounding of the part before continuing! By far the #1 complaint for beginning powder coaters is "the powder won't stick!". In virtually 100% of these instances, the problem is simply insufficient or improper grounding of the part.

An interesting fact is that the applied powder will continue to cling to the part for at least several hours unless it is wiped, brushed or blown off with a blowgun. If application results are not acceptable, simply blow off and coat the part again. To visualize the power of static attraction, observe how well a static charge can cause an ordinary party balloon to cling to a wall after being rubbed on a sweater. On a dry day it will remain for hours until the charge dissipates.

The "Cure"

No, this is not in reference to the rock group from the 1980s. This is the common, accepted powdercoating terminology used in reference to the baking process. The word "cured" is applied as a simple term to describe the complex sequence of chemical changes that occur in the powder as it clings to the metal surface once it's placed in a heated oven. It is very important, however, to understand that the cure is not a single occurrence but takes place in several phases which the powder must undergo before being fully cured.

The first phase is flow-out, or the melting of the powder particles. This phase can vary widely in temperature range (approx. 115-200°F) and is based on the individual powder formulation. As the powder transitions to a gel or semi-liquid state, it flows-out like paint to produce a smooth, even and level surface. Flow-out can be verified by quickly opening an oven door and viewing the parts and verifying that the powder surface has a wet or freshly painted look.

Following this, as the curing process continues, the powder begins to solidify and harden. It is in this phase where the chemical and molecular cross-linking reactions occur.

Lastly, the cool down phase is critical to complete the chemical processes taking place in the powder film and to provide maximum strength to the coating. It is best to allow the cured film to slowly cool to ambient room air temperature. This may be done by allowing the oven and parts to cool at the same rate or by removing the parts from the oven and allowing them to cool in room air. Never attempt to accelerate the cool down phase by exposing the parts to chilled air or water.

It is important to note that without allowing a full cure with sufficient time and temperature, the powder film will not achieve the durability that it is intended to deliver, and ultimately fail.

A good beginners "rule of thumb" is to allow the powder to first flow-out, then continue curing or baking at 400°F for 20 minutes in a pre-heated oven. Be aware that this is a starting point, and the rule generally applies to thinner, smaller stamped or sheet metal parts with typical Eastwood powders. There are always exceptions, such as some low cure temperature powders, which cure closer to 300°F, or some requiring higher than 400°F temperatures. To be completely assured of a successful job, always follow the powder manufacturers' label instructions. It is also very important to note that the physical density of the metal part to be coated can affect cure times. Heavier fabricated or cast parts will always absorb more of the oven heat which will require additional time in the oven to completely heat soak and reach full cure temperature. It's always a good idea to allow longer times (up to one hour) for flow-out on those heavier, denser parts.

Remember this Important Fact: Many first-time powder coaters have asked whether it is possible to overbake a part. While it is possible to cause damage to a powder film by going too high over the recommended cure temperature, a longer time in the oven at the recommended cure temperature will not affect the coating. Put simply, too hot will burn the coating – too long will not harm it. If unsure, curing an extra 5 or 10 minutes or up to an hour will not cause a problem.

As a side note: A burned coating is not necessarily a total failure. Most powders will easily withstand temperatures up to 500°F without affecting the integrity of the coating but the pigments will darken in appearance. This is especially noticeable in clears, whites, and lighter colors.

2. SAFETY & WARNINGS

HEALTH HAZARDS: Although the powder coating process is completely free of any solvents which might be harmful to the user or the environment, the powder, when propelled from the powder gun, produces a fine dust cloud that **should not** be inhaled.

Use a **Dust Mask (Eastwood #13000)** and **Safety Goggles (Eastwood #43090)** when handling the powder. This includes filling the gun bottle, applying powder, or cleaning the gun.

FUME HAZARDS: Unlike spraying paint which produces hazardous vapors, powder coating is virtually inert. There is a very short period when flow-out is occurring when some chemical vapors will be released from the process. For this reason, adequate ventilation should be available in the curing area.

DO NOT use an oven that will be used for food as those chemical vapors will condense and accumulate on the interior surfaces of the oven.

FIRE/EXPLOSION HAZARDS: Generally, powder coating powder is not flammable and will melt rather than ignite. However, as with any fine dust or powder, be aware of the potential combustibility in the ideal air/dust ratio.

Never use a gas-fired or other flame-based heating source to cure powder, and make sure any ventilation fans have explosion-proof motors.

Since vacuum cleaners can emit sparks from their motors, never use a vacuum cleaner to pick up unused or excess powder. Instead, sweep it up with a soft brush and dustpan.

Of course, never smoke or allow anyone who is smoking near the powder cloud when filling, applying, or cleaning.

SHOCK HAZARD: NEVER touch the emitter rod when there is power to the gun, as this can result in a significant high-voltage shock.

SHOCK HAZARD: NEVER handle or touch a part while powder is being applied. Your body will become a ground source and can result in a significant high-voltage shock.

Lastly, be sure to read the entire Instruction Manual included with the Powdercoating Gun thoroughly before beginning.

3. WHAT IS NEEDED TO BEGIN POWDER COATING?

First and foremost is a quality powder coating gun such as the versatile Eastwood PCS-250 Dual-Voltage Powder Coating System, Eastwood #33728 or the time proven Eastwood PCS-150 Single Voltage Powder Coating System, Eastwood #33272.

PCS-250 Dual-Voltage Powder Coat Gun #33278

PCS-150 Original Powder Coat Gun #33272

These both require a grounded 120-volt AC, 50/60 Hz power source with less than a 100-watt power demand and compressed air source capable of delivering a regulated 5 to 10 PSI at only 1-2 CFM.

For a beginner, there is no immediate need to invest in a large compressor, since a good quality airbrush or small pancake compressor with a good air pressure regulator will do the job.

Small Pancake Compressor #31289

Air Pressure Regulator #31834

As a powder coater's skills become more advanced with larger and more complex projects, a larger, higher capacity compressor can be purchased. It is critical that the regulated air supply is clean and dry. Any moisture present in the air will cause the powder to clump up and most certainly ruin the powder coating project.

In fact, although powdercoating is very user friendly, if it does have an enemy, it is in the form of moisture and humidity. Powdercoating powder in its container and the propelling air supply MUST be kept dry at all times. A discardable Desiccant Dryer, such as Eastwood #34146 mounted directly at the gun air inlet will work well for this purpose. A small Moisture Separator, such as Eastwood #34103 is also highly recommended. Store powder in a dry, low humidity environment and keep containers tightly closed.

Mini Desiccant Dryer - 2 pack #34146

Moisture Separator #34103

Select a comfortable work area with good ventilation but without a direct draft and free of any airborne dust or debris. Even though powder can be easily dusted or wiped off surfaces, surrounding surfaces and floor areas should be covered with sheets of paint masking paper or similar material for clean-up.

Because the charged powder cloud is electrostatically drawn to a grounded metal part, there is minimal powder waste as much of the powder sticks to the part. This includes around edges, inside crevices and around to the back unlike the typical line-of-sight application of sprayed on liquid coatings.

A minimal amount of powder, however, will fall to the floor and settle on surrounding surfaces. This should be taken into consideration when choosing an area in which to apply powder coating. A dedicated spray booth is best however a temporarily constructed cardboard enclosure can be helpful in providing an optimal finish and minimizing dust in the work area.

Work with plenty of light available but avoid direct sunlight, as excessive heat from sunlight can cause a partial cure to occur on parts. A corner of a basement, small room or other closed-in area is **NOT** a good powdercoating location. A bright, strong light source like a work light is needed to illuminate objects being powdercoated to be sure that full coverage is achieved. This is important since the uncured powder will adhere to the part and present a dry, fluffy, opaque appearance. Any areas that are not fully covered will be readily noticeable under a bright light as the light will shine through revealing any thin areas. Additional application of more powder to those areas is required.

Spend some time to plan out and set up a safe and efficient work-flow. It is very important to create safe work conditions. Allow sufficient room to move around in and consider the lay-out and location of all hoses and cables in the area before doing any powdercoating. Tripping over a cable or hose can cause injury and interrupt a good powdercoating job.

Carefully select an area for applying the powder, and where to put the oven for safe and convenient transfer from application area to the oven.

Also select a suitable heat resistant cooling area which can be a rack, shelf or rolling cart and plan out the most efficient path from the oven to the cooling area.

Doing a few practice dry runs with the powder gun in hand and all cables and hoses in place but without air or power connected will go a long way in becoming familiar with the feel of the equipment and the location of components. This practice will help greatly in performing a perfect first time powdercoating job!

A Word About Grounding:

Having a good path to earth ground is extremely critical to successful powder coating. Plugging the Powdercoating Gun into a grounded outlet is necessary and it will not work without it. For an added measure, it is a good idea to run a separate ground wire to a water pipe, outdoor grounding rod, the shell of an electrical panel box, etc. and terminate the opposite end with an alligator clip. This clip can be attached to the same grounding point on a part as the ground lead of the Powder Gun. See "Grounding" in Chapter 10 for more information on Grounding Rods.

An added benefit of powder coating is that it is not as adversely affected by colder temperature application as paint is. Powder can be applied in colder conditions like in a garage in winter, then the parts can be placed right in the hot oven for curing.

If moving uncured coated parts from a colder to warmer environment, however, be aware of the possibility of condensation forming on the metal parts.

The next major subject is a curing heat source. Many beginning and hobbyist powder coaters have found that a regular household electric **(NOT GAS)** kitchen oven works well. With most electric ovens having generous inside dimensions of roughly 20" wide by more than 12" high, items such as wheels, valve covers, manifolds, brackets, tools, toys, lamp parts, garden items and a lot more can fit in that space. Some high-capacity electric ovens have an even larger working space.

Even though Eastwood has a large commercial type of walk-in electric oven readily available in its own R&D facility, 90% of the Eastwood in-house powder coating projects make use of an inexpensive, used, Craigslist-sourced electric range. This type of electric kitchen oven and a medium-sized toaster oven will serve most home shop powdercoating needs perfectly.

Note that the powder coating process does release a minimal amount of chemical fumes and vapors and they will accumulate as a film on the inside surfaces of the oven. **NEVER use an oven that will be used for food!**

Also, please remember that since the powder curing process emits these chemical fumes for a very short period as the powder transitions through the flow-out phase, locating the oven in a work area with adequate ventilation is a must.

When utilizing a used or discarded electric kitchen range, don't rely just on the oven temperature controls. Buy an inexpensive oven thermometer to verify the accuracy of the oven's temperature control and monitor that it is delivering an actual 400°F curing temperature.

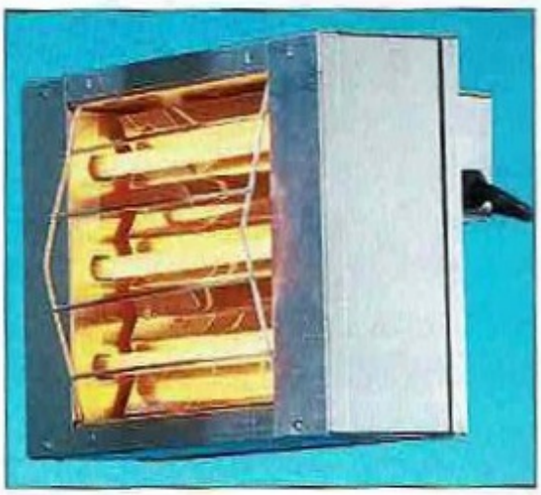
Also, consider that a properly wired and protected 220 Volt, 50 AMP circuit and power outlet is required at the planned oven location.

A helpful tip: After removing all the range-top cooking elements, their associated controls and wiring, a sheet steel benchtop can be fabricated to cover the entire range top. This makes the powder coating oven even more useful by providing an additional convenient work surface. This heat resistant work surface can also serve to provide a convenient cooling area for hot powder coated parts just removed from the oven.

Some large industrial manufacturing facilities use pass through, gas-fired ovens, but these are for high-production, commercial use only. Electric ovens provide the safest and most consistent cure for hobby or small business applications.

An alternative for smaller items is a countertop or benchtop toaster oven capable of maintaining 400°F (once again, one that will **NOT** be used for cooking food). An oven thermometer is required to monitor the proper temperature, as toaster ovens are notorious for poor temperature control.

Some of the larger countertop ovens have circulating fans which offer the advantage of providing more even temperature variation within the oven and are more capable of maintaining an even temperature distribution in the oven chamber.



Another curing heat source is Infrared Curing Lamps. Several Infrared Powder Curing Lamps are available from Eastwood, (#10170) and are a good solution for curing large, flat objects. They do require a great deal of experience to use successfully and must be used with extreme caution, as they can be very dangerous and quickly cause serious burns and or fires.

These lamps work by emitting powerful infrared radiation directly at powder applied on a surface, immediately heating it and causing it to flow out and cure within minutes. The use of a non-contact infrared thermometer is an absolute necessity.

There are several major drawbacks of these lamps. First is their direct line-of-sight limitation making it quite difficult to adequately cure irregular or curved surfaces.

Second is that quartz heating elements reach temperatures of 1400°F and the surface temperatures of the items being cured can rise very quicky beyond the cure temperature. The surface temperature must be controlled by constantly monitoring and adjusting the distance from the light to the part and the time spent in one location. Without monitoring and control, the surface temperature can easily soar above 400°F damaging the powder film and possibly the part being coated.

Eastwood Non-Contact Infrared Thermometer #31223

BURN HAZARD! The powerful infrared radiation emitted from the lamps, if directed at exposed flesh, clothing, or surrounding combustible materials briefly, can do damage or harm within seconds, causing serious flesh burns and or fire.

Always read the instructions provided with the curing lamp before use.

4. PREPARING OBJECTS FOR POWDER COATING

4A – Cleaning and Prepping Parts.

Carefully inspect the object to be powdercoated and make sure that any rubber, plastic, or other heat-sensitive pieces that might be damaged by the 400°F cure temperature are removed from the part. This includes clips, grommets, bushings, bearings, seals, housings and even some soldered items.

If the item is an assembly, it is always best to disassemble it if possible. Be aware of any operating mechanisms, linkage, hinges or other pivoting and movable parts. In some instances, cured powder can interfere with their operation.

As with any type of coating or finish, whether it be paint or powder coating, surface preparation is most important. Any previous paint, coating, or rust must be completely removed prior to powder coating. Most paints or old coatings remaining on a surface will not withstand curing temperatures and will burn and lift, causing failure of the powder coat. In addition, traces of paint will not conduct a charge the same as unpainted surfaces, preventing the powder from adhering to the part evenly.

Stripping

The absolute best method to remove old paint, coatings and rust from metal parts is abrasive blasting. A fresh, clean blasted surface is preferred because the slightly roughened or "profiled" texture from abrasive blasting will provide maximum powder adhesion. Of course, abrasive blasting requires a substantial compressor capable of delivering sufficient CFM (Cubic Feet per Minute) to operate the blasting equipment. Eastwood offers a wide range of abrasive blasting solutions ranging from basic, handheld "Out of a Bucket" kits (Eastwood #21109), enclosed cabinets (Eastwood #21301) and high-pressure blasting units (Eastwood #51118).

If blasting is not feasible, most areas have local shops which specialize in abrasive blasting who will provide this service at a reasonable charge and many professional powdercoaters will accept outside pre-powder stripping work. Alternate mechanical methods of removing old paint, coatings and rust are various forms of wire wheels, abrasive stripping discs and sanding wheels used on a drill or hand-held grinder.

Chemical strippers containing a high concentration of Methylene Chloride are highly effective in removing old paint or coatings. Keep in mind that these are powerful

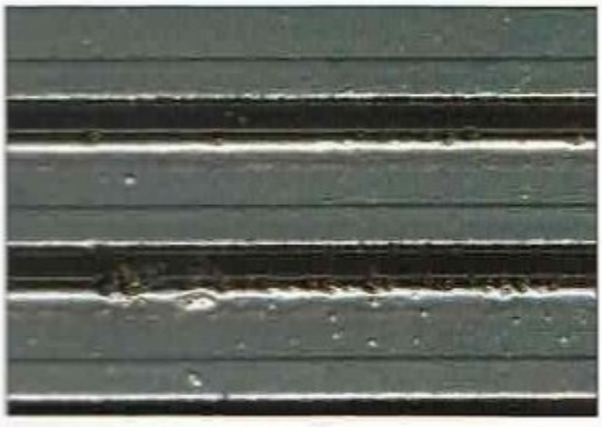
chemicals than can quickly burn skin and must be used with extreme caution and be disposed of properly. Just be sure that all remaining coating or stripping residue is completely removed, or the powder finish will be likely to fail either immediately or in the future.

Rust can be removed from iron and steel parts chemically by using products such as Eastwood Rust Dissolver or Fast Etch. Follow product instructions carefully and neutralize any solutions before applying powder.

It is critically important to remove all traces of grease, oil or other contaminants from the surface or the powder will not adhere. Many iron, aluminum, zinc, magnesium and other cast parts have microscopic pores that become saturated with these residues. They all must be removed before coating by wiping the part with a solvent such as PRE-Painting Prep (Eastwood #10041Z) or commonly available acetone.

Eastwood Pre Painting Prep #10041

After a thorough cleaning, a process known as outgassing should be done. After drying solvents, parts are placed in the oven at 450°F for an hour or so to bake all impurities out of the pores. Failure to do so will result in bubbles appearing in the cured powder surface from gases released by the impurities.



NOTICE: Die-cast metal varies widely in formulation. Many of these formulations can be difficult to powder coat, and in some cases may even melt at 450°F. Some aluminum and magnesium alloys can be weakened by exposure to cure temperatures. Check with a part's manufacturer if unsure. Also, avoid powder coating metal items that are soldered together as the solder may fail after exposure to cure temperatures. Lastly, do not forget to return oven to 400°F before curing!

Also be aware that certain die-cast parts, and many chrome-plated parts such as hood ornaments, trim pieces, taillight bezels, and nameplates are made from a very porous, low-grade "pot-metal" that will always outgas and release bubbles under the powder film when exposed to cure temperatures. These types of parts generally cannot be successfully powdercoated.

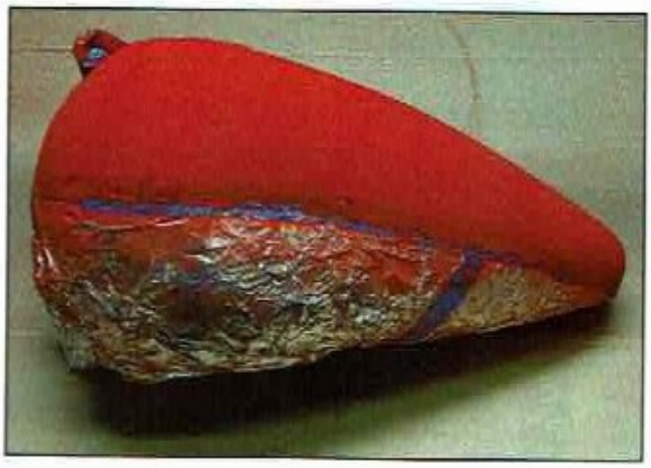
Once parts are cleaned, try to avoid touching them with bare hands as skin oils can affect the long-term adhesion of the finish. Nitrile gloves (Eastwood #16201) are useful for this. Do not skip or cut corners on the cleaning and prep process. Remember, the #1 rule of applying paint also applies here: The finish is only as good as the surface prep.

4B – Masking

Powder coating is easily drawn into recessed areas and threads and can cause binding. It is strongly suggested to plug female threads and cover male threads, pins, gasket mating surface areas and other areas where the thickness of the powder film will affect fit with mating parts or fastening hardware. Carefully analyze the part and decide which areas should and should not be covered. Suitable High-Heat Silicone Plugs and Caps are Eastwood #58041K. Masking is easily accomplished by covering areas with ordinary aluminum foil, or High-Temperature Powder Coating Tape. Suitable tapes are Eastwood #16315 Polyester Tape and #16322 to #16324 Fiberglass Tape.

Fiberglass tape is composed of woven fiberglass strands making it softer and more easily conformable to irregular shapes. Polyester tape is much thinner and provides a sharper, cleaner edge. Both can be cut and trimmed with a hobby blade, knife or scissors and are available in a wide variety of widths ranging from 1/8" to 2".

When masking larger areas, avoid wasting high-temp masking tape by using aluminum foil as a masking material. It will withstand curing temperatures and it easily conforms to parts. Cut the amount needed to mask the subject area then hold it in place with the High Temp tape, using the edge of the tape as the masking edge. Note: Both types of high-temp tape work well with foil.



When using masking materials, cover all areas where powdercoating is not desired, apply the powder, then cure the part. Masking materials can be removed once the part is fully cured. All silicone plugs and thread caps can be re-used indefinitely by simply peeling the layer of cured powder from their surfaces.

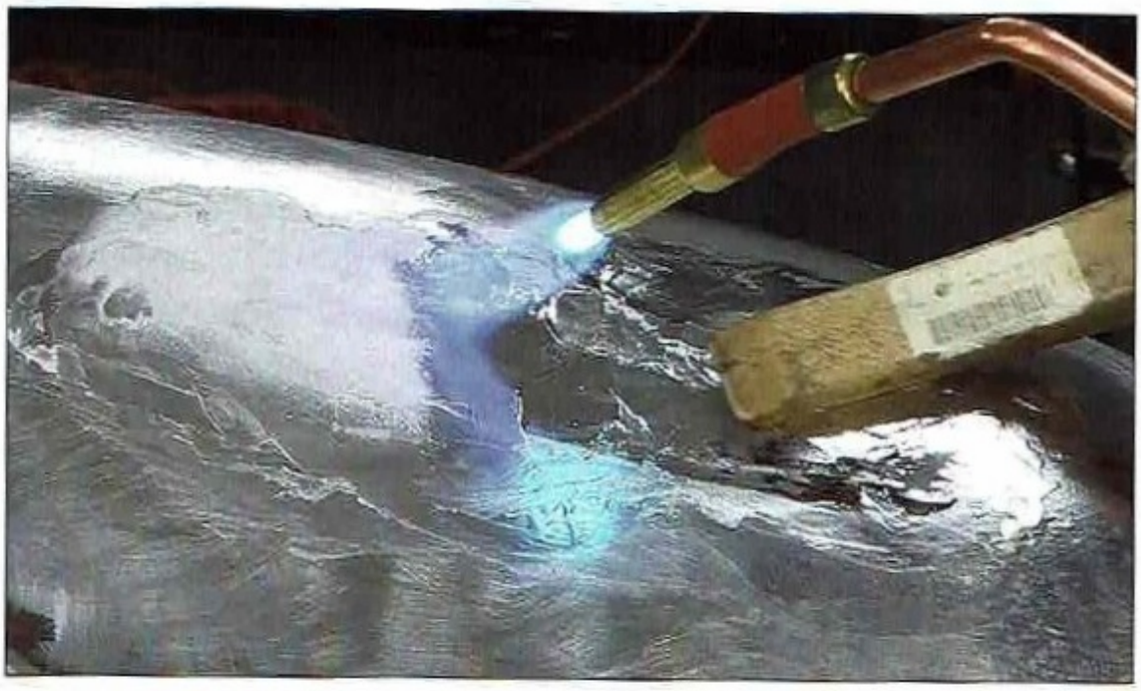
4C – Using Filler Under Powder Coat

#10288Z Hi-Temp Lab Metal 24 oz

Flawed or damaged parts that have small holes (less than 1/4"), pits or other imperfections can be filled and smoothed out before powder coating. Standard body fillers absolutely cannot be used since the curing heat will destroy them. Although numerous metal-based fillers are available, most are not electrically conductive and will not attract the powder. This is an extremely important point to remember: several fillers are available that will withstand the 400°F curing temperature however they will not accept the charged powder leaving a bare spot on the part. A good quality metal-based filler that can withstand curing temperatures and is electrically conductive is Alvin High-Temp Lab-Metal (Eastwood #10288Z).

To use this filler, thoroughly clean and degrease the part paying particular attention to any impurities remaining in any cavities or low spots to be filled. Impurities left under filler will outgas, creating bubbles which could dislodge the filler. This type of filler can also be used with limited success to build up features or details on a casting or other part. Follow all usage and safety instructions on the filler can label. Following use, it can be filed and sanded to match the contour of the part.

Another very good alternative is to use old-school body solder, also known as leading, to fill holes, voids or dents in metal parts or panels. Eastwood offers several body solder or leading options. However, the #11462 Lead-Free Body Solder Kit is recommended as its 428°F+ melting point is greater than the 368°F melting point of traditional 30/70 lead/tin and will better withstand powder cure temperatures. Body Solder does an excellent job of conducting an electrical charge, allowing powder to be attracted to the surface uniformly.



5. HANGING AND SUPPORTING OBJECTS FOR POWDER COATING.

5A – Hanging Lighter, Smaller Items

Hanging the parts for powder coating takes some forethought and planning as it is critical to maintain a good ground to the parts. Parts must not bump into one another or fall while being coated or in the oven so they must be hung securely. The hooks should not cause shadows or bare spots on visible surfaces. It is always best to hang parts from the rear or from an internal feature if possible, leaving the most visible surface facing outward or upward.

If a threaded hole is available, consider running a scrap screw of the same thread partially into the hole then hang the part from it. For non-tapped holes, sheet metal screws of a size larger than the hole can be gently run in to provide a good grounding and hanging point. Just be sure that the selected hanging point is secure enough to support the weight of the part.

Eastwood Pre-Formed Wire Powder Coating Hooks Eastwood #58111 are made of thin but strong .063 diameter steel spring wire and will support up to 5 lbs. individually and more weight by using multiple hooks. The thin profile of the hooks does not block powder from reaching the surface of the part. By attaching the grounding clamp to the hook a good ground can be maintained while avoiding the marring the final surface finish.

Stainless Steel Wire Spool (Eastwood #43045) is made of 0.041 diameter stainless wire and is useful for fabricating small and custom configured hooking arrangements. Another great use for the Stainless-Steel wire is stretching and securing it on both ends then clipping the Ground Clamp to it. Individual parts are then hung in a "clothesline" approach. Another is to run a section of wire from part to part making good ground contact and clip the Ground Clamp to it.

Never use wire that is coated. Most wire coat hangers and hardware store roll wire have a clear protective or anti-rust coating which will prevent proper grounding. Also, if re-using hooks, be sure they are scraped free of cured powder which would prevent a good ground.

Large size paper clips when bent into an exaggerated "S" shape also make excellent and inexpensive, light duty, groundable hooks. Don't use aluminum, copper, or other softer metal as a hook/hanger as it will likely soften and weaken from exposure to the cure temperature then fail, dropping the part.

If a part should be bumped or the applied powder becomes disturbed before it has been placed in an oven and cured, the powder can be quickly removed. Using a gentle stream of compressed air, the powder can be removed from a localized area of a larger part and that area recoated. The safest method, however, is to blow off all the powder and start over.

A standard 6' aluminum step ladder makes an excellent hanging rack but for safety, be sure to blow off any excess powder that may have accumulated on the surface before using it as a ladder again.

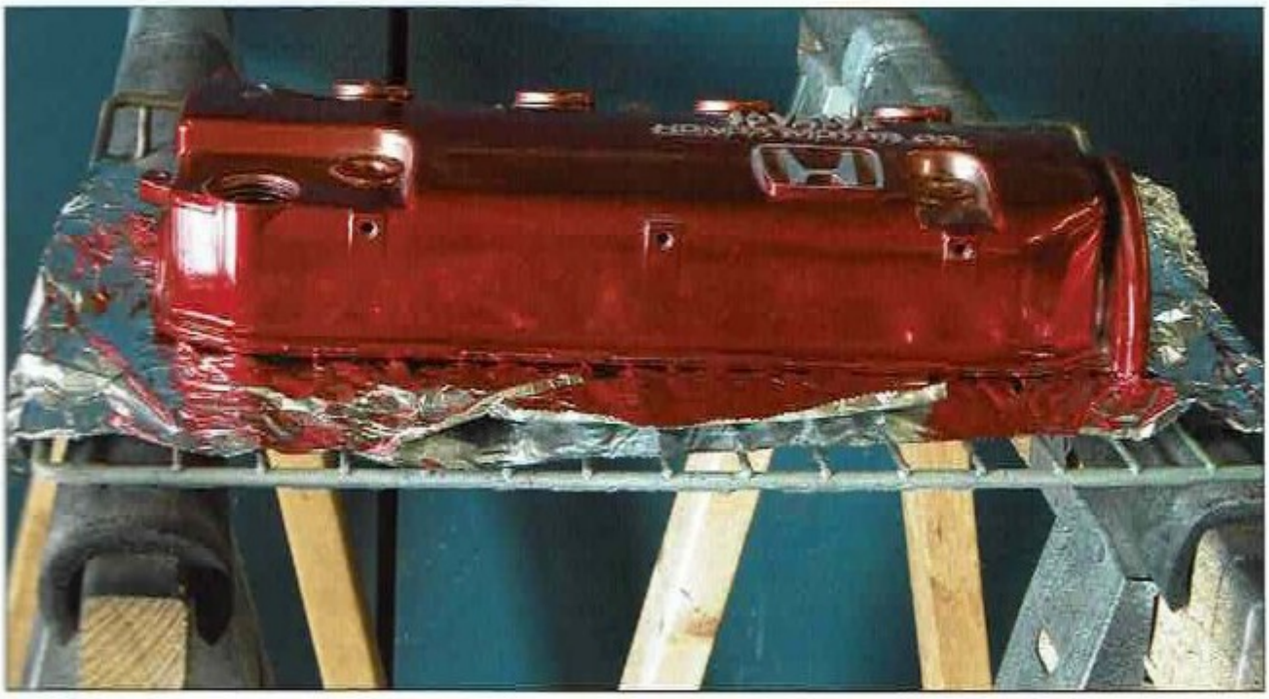
By using a combination of scrap metal rods or bars attached with C-clamps or clamping pliers, any combination of additional hanging surfaces can be created on a ladder. Just be careful not to overload it or cause a tipping hazard.

- An alternative is to use a purpose-built rack such as Eastwood's **#15556, Paint and Powder Coating Stand**.

5B – Supporting Heavy Objects

If a part is too large or too heavy to be safely hung with hooks or wire, it can be supported by one of the oven racks from the powder coating oven. A rack firmly supported over the tops of two sawhorses and held down with C-clamps, makes a great work surface for coating. If using an oven rack, cover it with aluminum foil to mask it from unwanted powder accumulation. As an added benefit, the foil (with ground lead attached) will serve as a good ground. The entire rack with parts can be placed into the oven for cure.

An example of parts that may be too heavy or cumbersome for safely hanging on hooks are automotive wheels, particularly those made of steel. Support the rack firmly, place foil on the rack, ground the wheel and apply powder. The rack with the foil and wheel in place can be slid into an oven as is.



A good method to coat all surfaces of a wheel is to do it in multiple steps. First coat the rear, less visible areas of the wheel, placing it in the oven to cure and letting it cool. Next, coat the highly visible face then once again cure and cool the wheel. Doing the less visible areas first will eliminate the likelihood of having a sandy, gritty textured finish as a result of any overspray powder blowing through spokes or cutouts in a wheel. Of course, any openings, cutouts or spaces between spokes could also be masked.

6. APPLYING THE POWDER TO PARTS

Before beginning, wear a suitable dust mask (NIOSH N95 is best) available at Eastwood as #13000 or # 31575 and eye protection. Work in a well-lit area with good ventilation. As previously outlined in Step 3, for safety and to avoid a painful fall, all the cables and hoses associated with the Powder Coating Gun should be routed in a safe manner so they will not present a dangerous tripping hazard.

Once the parts are hung and a good ground is established as described in the previous sections of this book, follow the powder gun instructions closely for air pressure settings and adjust the regulator accordingly. **NOTE:** Eastwood HotCoat Guns require only 5 to 10 PSI at 1-2 CFM.

Using a small funnel, add the proper amount of fresh powder to the cup per gun instructions. **NOTE:** Eastwood HotCoat Gun cups are to be filled halfway, as a maximum fill level. More than that will greatly diminish gun performance. It is always a good idea to sift the powder while filling the cup to isolate or break up any potential clumps. A commonly available flour sifter works well.

Hold the gun about 6" to 8" (never closer than 4") from the surface and apply powder in a gentle, steady, sweeping motion, keeping the gun in motion to ensure full coverage all around the part. **NOTE:** Be very careful not to allow the emitter rod of the gun to get too close to the grounded part. If this happens, it will create an electrical short causing a high-voltage spark to jump from the emitter to the part, resulting in a burned spot in the powder finish and the remote possibility of the powder cloud igniting.

As spraying continues, it will immediately become evident that the powder is being electrostatically drawn right to the part. Apply enough powder to uniformly cover the surface.

Any areas that are not fully covered will be readily noticeable under a bright light as the light will shine through revealing any thin areas. Additional application of more powder to those areas is required.

A little powder goes a long way, and more is not better at this point. Applying too much powder will result in an uneven film build and produce a lumpy, uneven finish after cure. Also, the part surface will only attract so much powder, and excess will fall to the floor, creating waste. Applying too little powder will result in a thin, weak coating with areas of metal showing through after the cure. Neither condition is a major problem as both are correctable. If powder is applied too thickly, it can be wet-sanded smooth like paint. It can also be chemically stripped, re-cleaned and recoated. If applied too thinly, the part can simply be recoated right over the first coat.

Before curing, if the parts should bump together, if a hand touches a part, or if a part should fall to the floor, it's best to use an air gun to blow the applied powder off the part and start over to avoid having an uneven spot in the finish.

When done properly and using a full gloss powder, the resulting finish is usually completely smooth and even with a pleasing high gloss. Occasionally when applying powder coat to some larger metal panels with open, flat expanses, some unevenness or "orange peel" texture may appear after cooling. This is caused by the

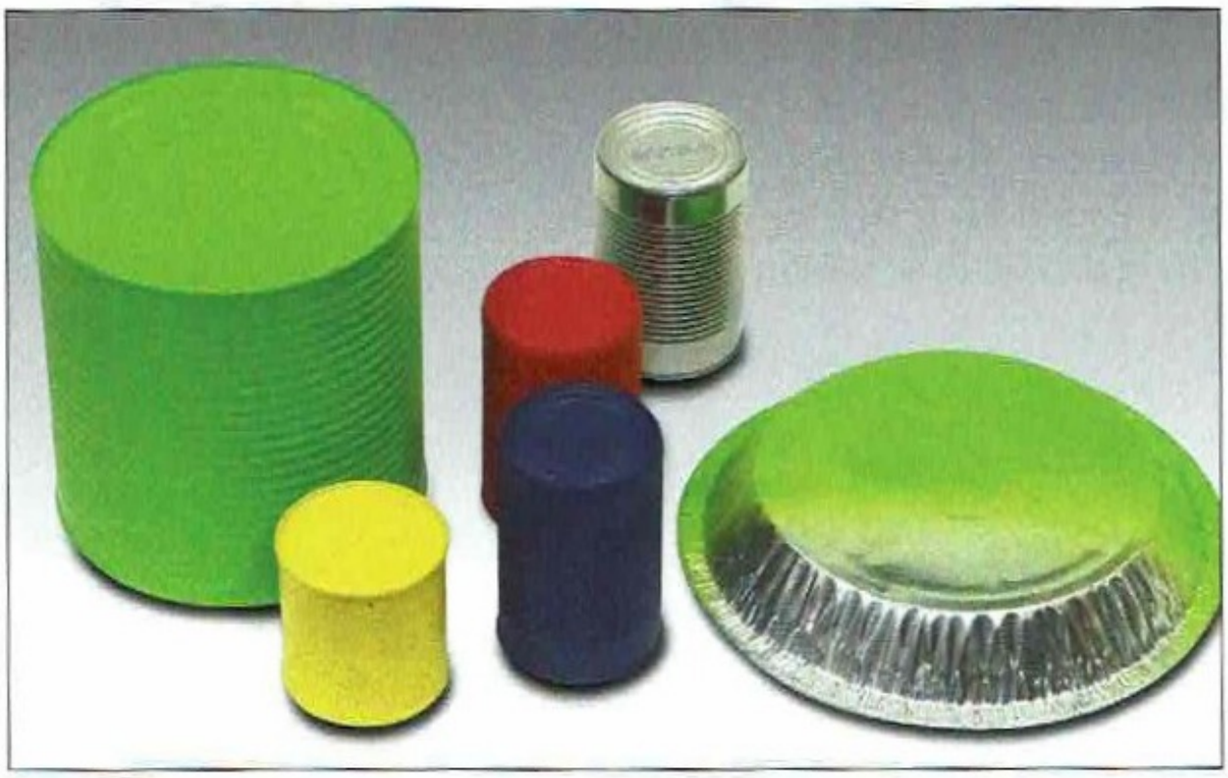
greater expansion and contraction of larger sheet metal panels. When hot, the powder film looks smooth and glossy however, as the panel cools, the powder film can begin to pick up a slight unevenness or texture. If the exact conditions exist to create it, it is difficult to avoid. In some cases, controlling the cooling rate by leaving the part in the oven to cool slowly will minimize the effect.

When finished, carefully sweep up any excess powder while wearing a NIOSH mask, disposable nitrile gloves and goggles. Recycling powder is not recommended as any debris in the powder will result in a rough surface and a compromised finish. Contaminated powder can be safely disposed of in the trash.

WARNING: Powder dust in heavy concentrations is potentially flammable! Due to the possible explosion risk, never use an electric vacuum, ShopVac® or wet/dry vac to clean up powder!

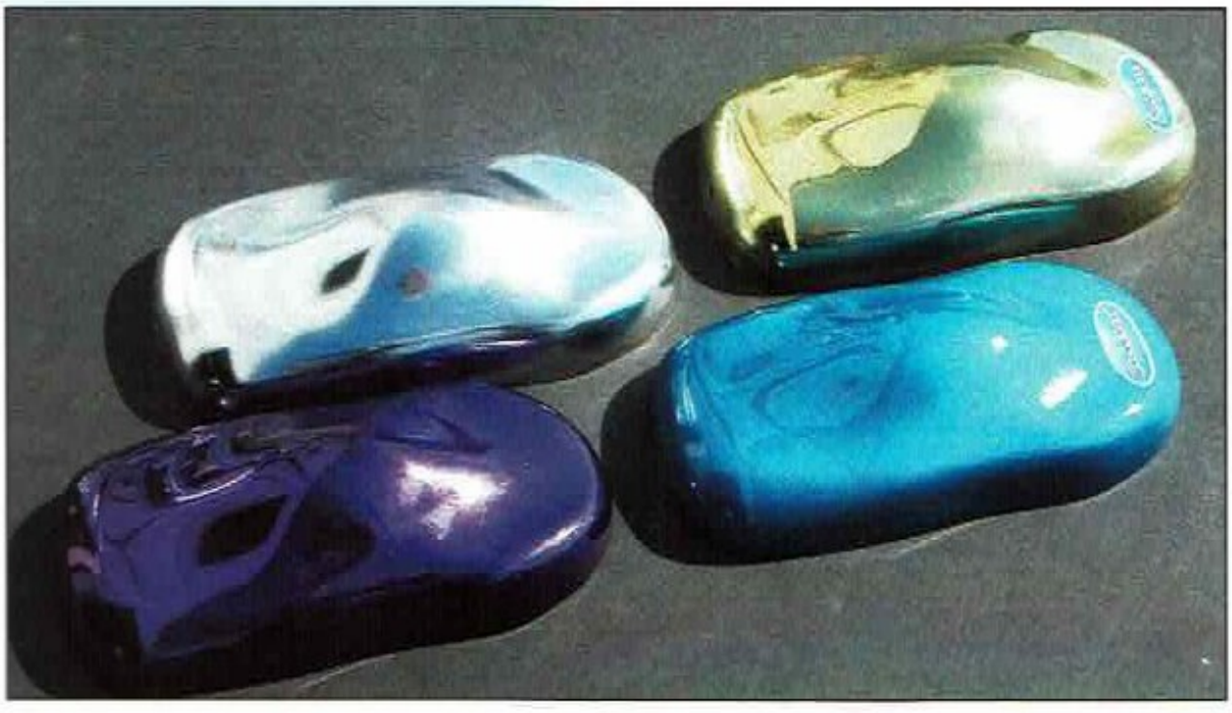
A final word of advice before starting

It is highly recommended to practice the entire powdercoating procedure on discarded metal cans or other scrap parts before tackling a project on an object of great value. Used coffee, soup, or tuna fish cans are an excellent low-cost means of perfecting the powder application techniques. Yes, some powder will be wasted in the process, but soon you'll have mastered powder coating and have a lot of great looking tuna and soup cans as a bonus. It really is that easy.



7. ADVANCED POWDER COATING TECHNIQUES

Once a comfortable level of confidence has been achieved, it's time to explore some advanced, professional powder coating techniques and methods.



7A – Applying Clear, Translucent Colors and Smoked Tints Over Chrome-Plated or Polished Metal.

Applying translucent reds, blues, greens, etc. over chrome-plated or highly polished steel and aluminum will provide spectacular results. No special preparation is required for polished metal other than thorough cleaning to remove any remnants of polish residue which, if left behind, will prevent good adhesion of the powder. Use Eastwood PRE Painting Prep (#10041Z) or acetone with clean, lint-free wipes to remove all traces of oils or contaminants. Pre-baking is strongly suggested to ensure that all impurities or remaining polish are removed. Keep in mind that some chrome-plated parts such as hood ornaments, trim pieces, etc. may be made of a poor-quality, porous, die-cast "pot metal" which will always outgas when baked, possibly causing bubbles under chrome-plating. These items should not be powdercoated.

As repeated several times throughout this book, a good ground is critical. One of the most difficult aspects of successfully applying translucent powders is producing a uniform thickness over the entire part. Translucent colors will appear darker in color when applied thicker, and lighter in color in thinner areas. Although it requires a good bit of practice to master, this too will become easier to control as the technique is learned. As suggested previously in this book, practice on metal coffee or soup cans to develop the special technique of applying an even coat of translucent powder.

7B – When to Apply a Clear Powder Over a Powder Color

Most powders are formulated to withstand harsh weather, UV sun exposure, and provide excellent impact and scratch resistance on their own and do not require a clear topcoat. The exceptions are some custom metallic finishes such as those like Eastwood #10211 Copper Vein, which will benefit from or require the additional protection of a coat of clear powder. These powders generally will provide an indication of the need for clear coating in the product information or on the packaging instructions.

7C – Applying a Base Coat

A basecoat is not required except for special effects powders. All standard powdercoating powders are formulated to be applied directly on a part as a single coat only. This is especially true with Eastwood HotCoat Powders. The formulations are fully opaque and when applied in a normal thickness, will completely hide the metal surface being coated. The application of a lighter or darker color is not required and will not affect the final color. The only exception is when using translucent colors and certain special effects metallics and pearls that are transparent or semi-transparent. These will require a reflective or specific basecoat. Any need for a basecoat will be specified in the product description and the individual powder instructions.

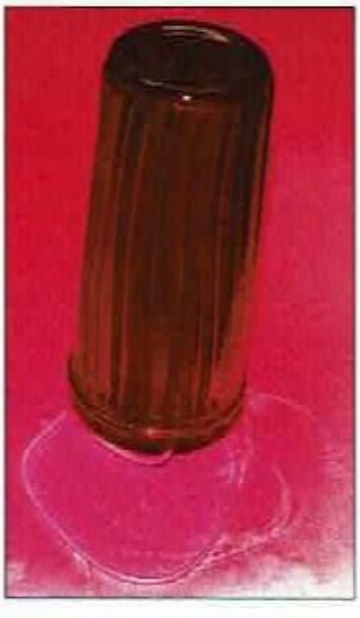
7D – Applying Clear, Translucent Colors and Smoked Tints Over "Chrome" Powders or Silver Bases

One of the most important steps is to apply the chrome-colored powder (such as Eastwood Reflective Chrome #11504) in an even, flawless coat and let it fully cure. Many novice powder coaters fail to let the chrome or silver base fully cure and the results are a muddy, grayish-looking finish that is a result of the two coats melting and blending together. With a full, proper cure of the base, the clear or translucent will bond to, but not melt into, the base, leaving a brilliant finish with great depth. The application of the clear or translucent powder is exactly like the application over chrome plating or polished metal; the translucent colors will appear darker in color over thicker areas and lighter in color over thinner areas. Once again, practice on discarded metal coffee or soup cans to develop the technique for applying an even coat. Please note that the application of a clear of translucent powder over a chrome powder or silver base can be accomplished by fully curing the base coat of powder, letting it cool then applying the clear or translucent powder over it then placing the part in the oven for a second cure. There is an advanced technique for applying clears and translucents that is known as "Hot Flocking". The following section describes this and how to do it.

"Hot-flocking"

This is a professional term used to describe the process of applying powder to a pre-heated part and having the flow-out phase begin immediately when powder comes in contact with the hot surface. This technique is useful when an excessively thick film of powder is desired, in some multiple-coat applications, two-tone powder projects, and for resolving stubborn Faraday Cage Effect cases. It can even be used for coating non-conductive, non-metallic temperature resistant objects like glass and ceramics.

Even though it is not electrically conductive, glass is highly stable at oven cure temperatures and can readily withstand the 400°F cure temperature with no ill effects. Some spectacular results can be achieved by applying transparent colors of powder over clear glass objects like vases, food jars, and figurines providing a method of quickly and easily transforming a plain, ordinary object into a thing of great beauty. In fact, upon close inspection, it becomes obvious that most inexpensive decorative colored glass items made today are not colored glass at all but are powdercoated with translucent powder!



Many stained-glass artists use powder coating to apply translucent colors to flat panes of clear glass which duplicates the look of expensive colored and stained glass. When done properly it is virtually indistinguishable from the real thing and is a fraction of the cost.

Please keep in mind that this process is a bit more complex and dangerous than standard room-temperature application and requires the use of an infrared thermometer such as Eastwood's Compact Infrared Thermometer (Eastwood #31223) to monitor an objects surface temperature.

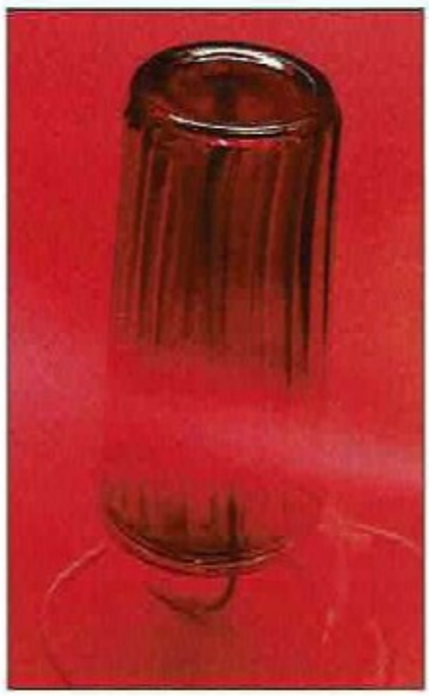
NOTE: It is also advisable to have a capable helper on hand as this process involves removing an **extremely hot** object from an oven, coating it while monitoring the surface temperature with the IR Thermometer, and applying powder quickly before the object cools too much for powder flow-out.

#31223
Eastwood Non-Contact Infrared Thermometer

How to "Hot-Flock"

First, the cleaned and prepped part is put into an oven pre-heated to 400°F and allowed to fully heat to the cure temperature or slightly above. (Temporarily setting the temperature to 425°F-450°F will enable the object to retain heat a little longer). Once it is verified that the object is at 400°+, it is quickly removed from the oven.

WARNING: the object removed from the oven will be **extremely hot** and severe burns can quickly occur. Exercise extreme caution.



Powder is then immediately applied. The powder film will initially look dry but will almost instantly take on a wet appearance, indicating that flow-out has taken place. At this point, keep the gun moving with powder flowing out of it until the entire object has been satisfactorily covered. It is necessary to work very quickly at this point as the part will be rapidly losing heat. Having an assistant reading the surface temperature with an IR Thermometer while applying powder is important as the surface temperature must not dip below 250°F or complete flow-out will not occur, resulting in a lumpy, rough, sandy finish. This process allows the powder to melt on contact with a pre-heated surface, so the surface must be kept hot enough to cause melting and the resulting flow-out of the powder.

Once the object has been coated to satisfaction, quickly place it back into the oven **(be sure to set it back to 400°F)**, let it warm back up to 400°F, then keep the object there for a full cure period.

The object can be taken out after full cure and be subjected to multiple "hot-flock" cycles if a thick, plastic-like coating is desired. This is often desirable for producing a smooth, level finish on rough cast parts.

If hot flocking on glass with translucent colors, practice getting a uniformly thick coating to achieve an even color. If the powder thickness is not uniform over the entire object, thinner areas will be lighter while thicker areas will appear several shades darker.

Creating two-tone color schemes and masking

Building upon the advanced techniques described so far in this chapter, the following are some even further advanced custom procedures. The possibilities with these techniques are limited only by imagination. When doing two-toning or multiple color detailing, it is vitally important to use powder formulations which are compatible with one another as Eastwood powders always are.

Also, always remember these basic, multiple coat powder rules:

- Always fully cure chrome base coats, even when applying clears or translucents.
- Never fully cure epoxy primer base coat - cure only to complete flow out of part, let cool and apply the top coat. This will assure maximum intercoat adhesion.
- When doing multiple coats **NEVER** fully cure base coats. Apply the main color first, cure just until flow out of entire part, remove, and let cool.
  NOTE: The only exception to this rule is when using chrome powders as the chrome powder must be fully cured before the clear topcoat. Mask out the part and apply second coat. Insert the item in oven with all masking material intact and fully cure as per powder instructions.

The following are several popular examples.

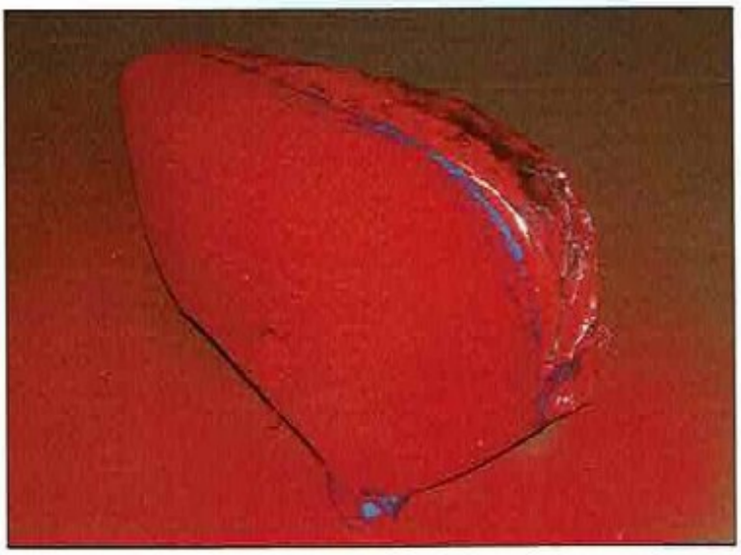
Two-tone Finishes

The two-tone color scheme on the gas tank pictured was created by first coating it with a high-gloss black powder, letting it cure, then allowing it to cool to room temperature, masking, then applying the orange powder in the following sequence:

- A good ground attachment point was established using a sheet metal screw threaded into an existing hole with a piece of Stainless Wire wrapped around it and leading to the Ground Clamp
- The black powder was applied using standard methods and permitted to cool.
- Once the proper curve of the color separation line was decided upon, the separation line was edged with High-Temp Powder Coating Masking Tape.
- The tape edge must be pressed tightly against the surface to eliminate any edges the powder could migrate under.

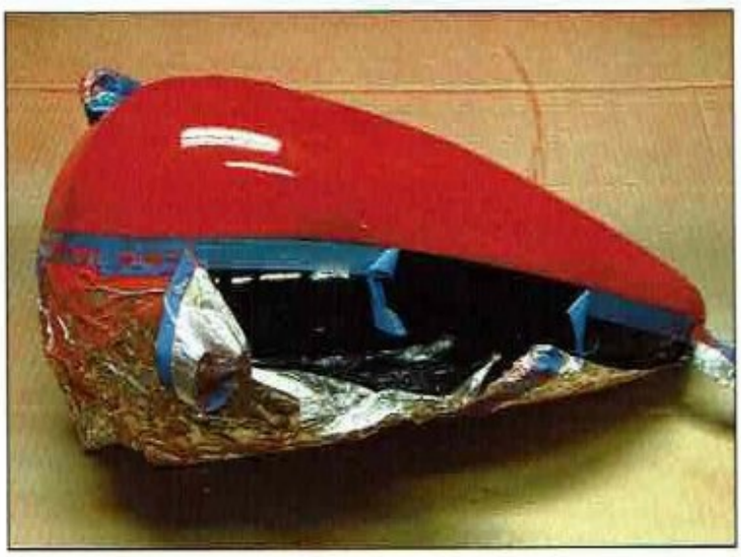
- Several sheets of standard, grocery store variety food-storage-type aluminum foil were used as a masking material over the previously applied and cured black powder and held in place with the high-temp tape.
- The tank was then coated in high-gloss orange powder. After that, it was placed back into the curing oven and allowed to flow out and complete the orange cure.

Once removed from the oven and allowed to cool, the foil and tape were removed, leaving a great-looking two-toned gas tank.



Minor wet sanding with 600 grit and progressively finer abrasive paper may be required to remove any edge that can sometimes occur at the second color separation line.

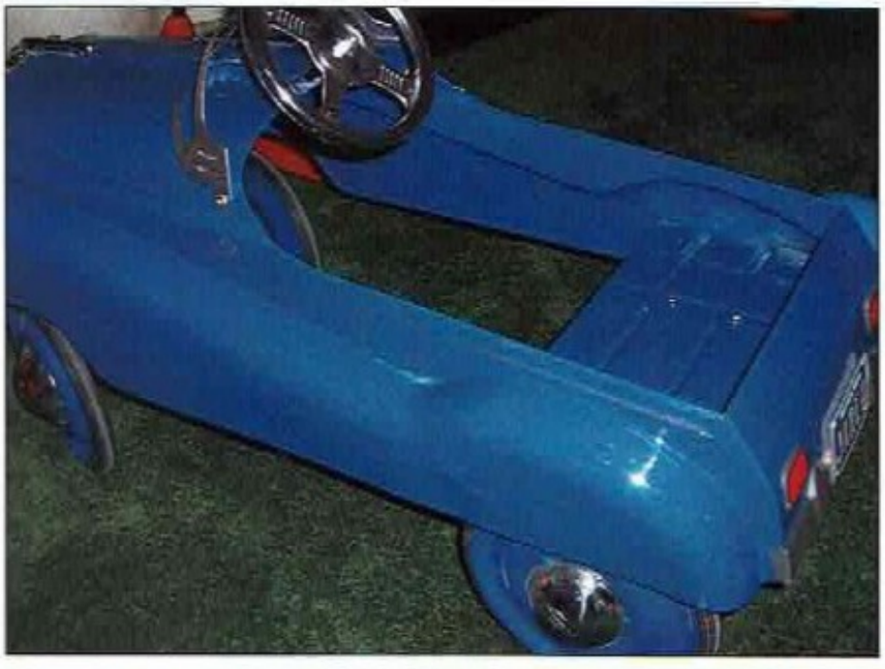
An alternative is to topcoat the object with clear gloss powder to bury the edge. This is a finish that will rival any painted tank in appearance, but it will be far more durable and last much longer.



Multiple Color Detail

By careful and exacting masking techniques and multiple applications, Powder Coating allows great flexibility in the ability to create finely detailed, multiple color projects as seen in these wheels.

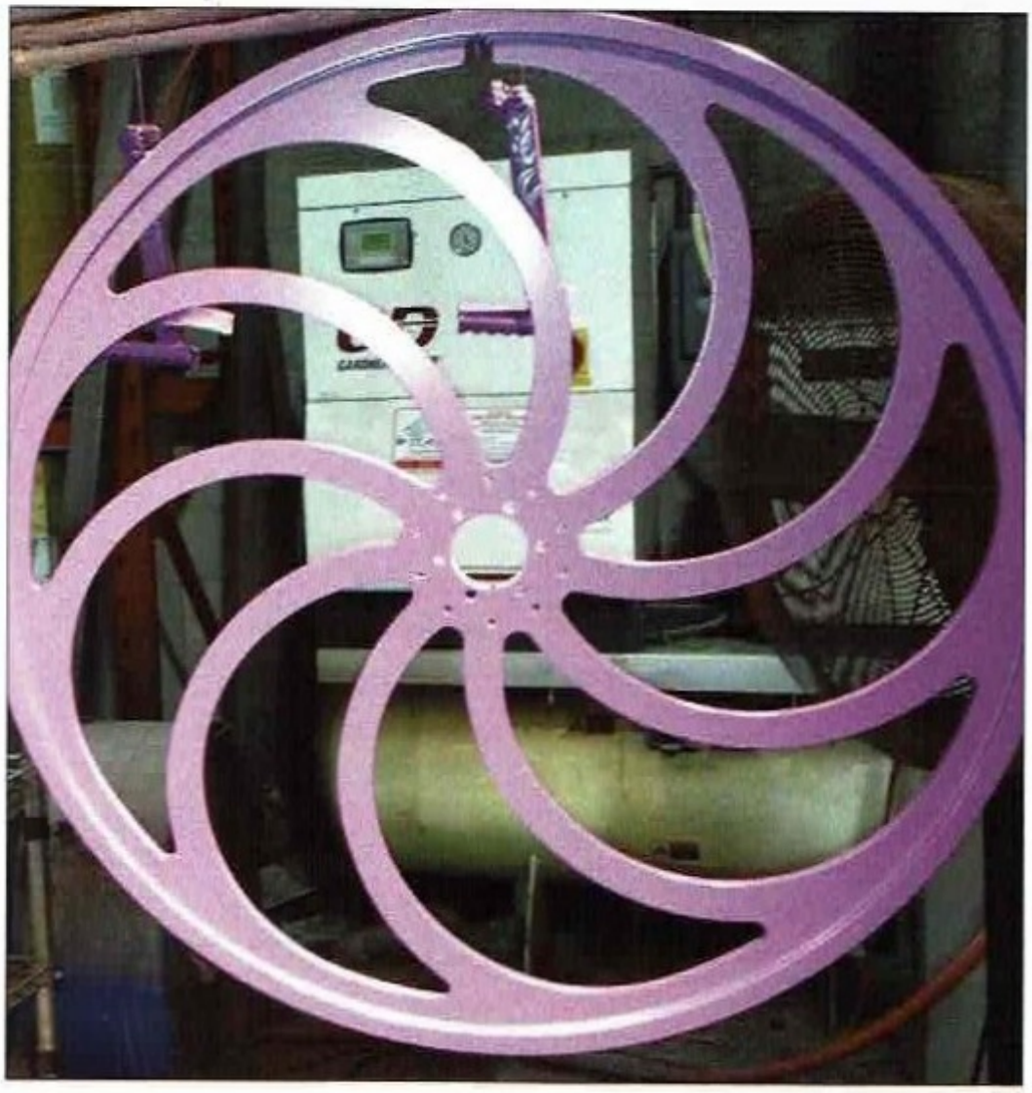
The entire body of this pedal car along with the grille and bumpers, headlights, taillights and "chrome" side spear trim were all done by careful masking using high-temp tape, foil and doing multiple applications.



Fogging or "Fade Out"

A new process that is gaining popularity in the powdercoating community on wheels, valve covers, tanks, fenders etc. recalls a painting technique that was very popular in the 1960's on custom cars and motorcycles.

Note that this technique is also great for creating multicolor flames on motorcycle tanks and fenders.

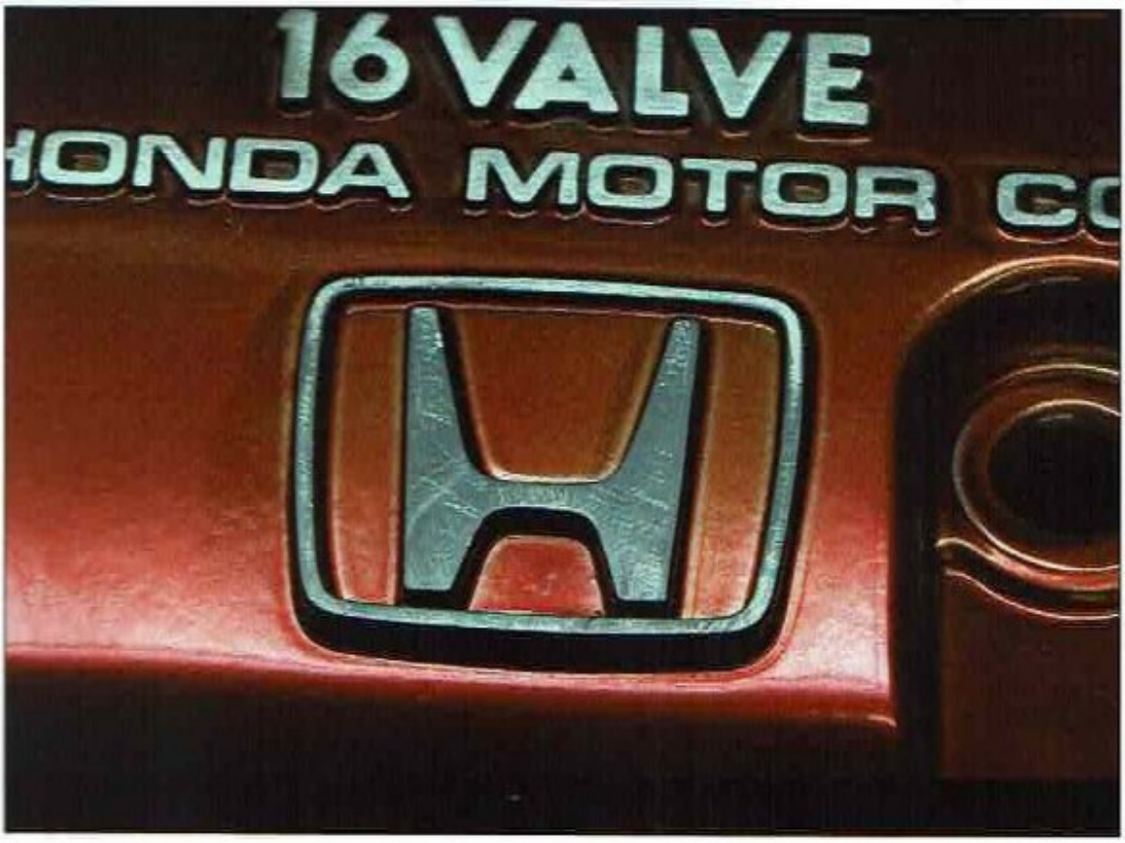


To do Fogging or Fade-Out:

- Apply a first color (pink as in seen in image) Do Not Cure.
- Clean gun and apply the second color (purple as in image) by spraying in random areas of part or from a distance of 18" to get completely custom effects. Again, Do Not Cure.
- Clean gun again and apply 3rd color highlights.
- Place part in the oven for a full cure.
- **Note:** This technique does involve practice to achieve desired and repeatable effects. Time for more custom finished coffee cans!

Highlight Raised Features

Another popular custom powder coating technique is highlighting raised features such as lettering, numbers, symbols, ribs etc.



- In this example, an uncoated die-cast aluminum valve cover is initially de-greased and cleaned thoroughly–top and underside–then pre-baked for over an hour at 450°F to remove any residual impurities from the casting pores.
- After pre-bake, a thorough follow-up cleaning with Eastwood PRE Painting Prep or acetone should be done. **NOTE:** This cleaning is extremely important as any remaining grease, oil or dirt will prevent proper adhesion of the powder or cause the cured powder film to fail in use.
- Next, apply the translucent powder over the entire part, then very carefully and slowly dust away the powder covering the raised logo detail, using a fine hobby or artists paintbrush.

The greatest difficulty that may be encountered with this method is avoiding having the excess powder drop in clumps onto the covered surface. This technique works particularly well when you wish to polish, then expose, the edges of the cooling fins when powder coating motorcycle engine cylinders.

For those not comfortable with the "dusting" technique an alternate method for highlighting raised features is to apply High-Temp Powder Coating Masking Tape to the logo or raised detail, then trim around the feature up to the edge with a sharp hobby knife and pull the excess trimmed tape away.

The transparent powder is then applied, and the part is cured. Following the curing step, the part is allowed to cool, the tape removed, and the bright metal raised feature of the part is revealed.

Yet another "trick" for creating lettering and other features on flat, contoured or other non-raised surfaces is to cut your design out of adhesive-backed vinyl sheet or use pre-cut letters as stencils. Stick them to the surface, apply the powder then very carefully remove the stencils before placing the part into the curing oven.

The Use of Primer Powder, When and How

Generally, for most powder coating projects primer is not necessary. If the powder is properly applied to a previously described, bare, clean (preferably abrasive blasted) surface, the powder chemistry and thermoset cure will allow it to tightly bond to the surface.

For items subjected to extremely harsh weather or marine conditions, a powder primer such as (Eastwood #10301) may improve weatherability. A special technique must be used as follows:

- Apply the epoxy Powder Primer as normal with an even film build – do not apply a heavy coat; the primer is just there to seal the part to aid in topcoat adhesion and provide a layer of corrosion protection.
- Insert the part into 400F preheated oven, check part and remove immediately once entire part flows out - DO NOT FULLY CURE epoxy Powder Primer or it will have intercoat adhesion issues.
- Once part is cool (below 100°F), apply the topcoat of choice, covering and curing as normal.
- Following this process will assure a compete chemical and physical bond between the epoxy Powder Primer and your topcoat for the ultimate in durability.

Grounding

As proficiency in the powder coating hobby grows, more projects and complex multi coat projects will naturally follow. A proper ground is the single most important factor in successful powdercoating and a dedicated grounding circuit will benefit greatly in achieving multiple coats. Home center stores all sell Ground Rods. They are 6' - 8' in length and designed to be driven into the ground outside of a garage, home or shop. Also purchase Rod Clamps and a sufficiently long roll of 10-gauge wire.

- Drive the rod into the ground **TIP:** drive it in on slight angle, about 20°. This will aid in driving completely into ground deflecting around rocks or obstructions and not into them).
- Attach the 10-gauge wire to the Ground Rod with the Rod Clamps.
- Run the 10-gauge ground wire into the shop and connect the opposite end directly to the parts hanging rack or powder application booth.
- This will provide a solid and sure ground connection.

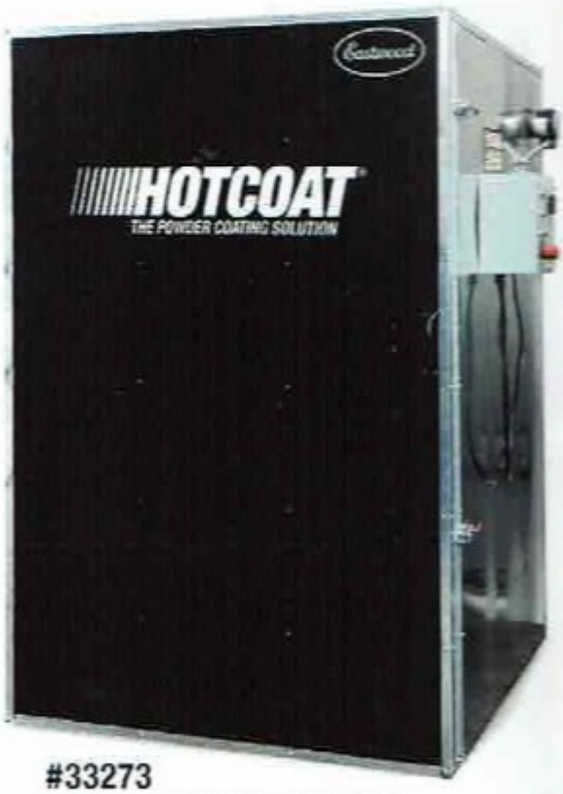
Well on your way.

By mastering the above techniques, many custom effects can be created such as flames, custom lettering, logos and graphics. You will be well on your way to becoming a highly advanced, custom powdercoater, and will no doubt become the "go-to" person for powdercoating among your friends, family and co-workers.

If you haven't already thought of it, why not take the next step by transitioning your hobby into a money-making venture. The staff at Eastwood is ready to help with technical support and advice on acquiring the professional equipment like commercial walk-in ovens (Eastwood #33273) and powder coating booths (Eastwood #33276). In many areas local small business organizations can provide guidance on obtaining financial assistance, finding a suitable shop location and much more.

The Powder Coating Institute **www.powdercoating.org** is an excellent source of education, assistance on setting up a successful business, how to charge customers and more.

For detailed information on what is needed for a well-equipped shop or business, refer to Chapter 10, Advanced Equipment Needed to Go To The Next Level.



#33273
Eastwood HotCoat 4x4x6 240 Volt Powder Coating Oven

#33276
Eastwood HotCoat 4x4x6 120 Volt Powder Coating Booth

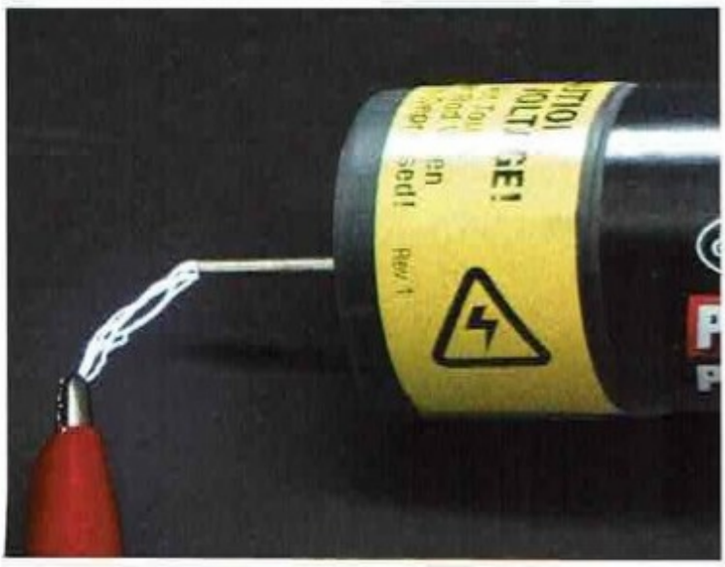
8. PROBLEMS, CAUSES AND SOLUTIONS

This section covers the majority of what can sometimes go wrong and how to remedy it if it does.

8a. The Most Common Problems That Occur During Powder Application

The powder is not sticking and is just falling all around the part.

- Is there power to the gun?
  - ✔ First, check that the power cord is properly plugged in and the circuit is live.
  - ✔ Next, verify that the powder gun is producing a charge to the powder (**NOTE:** some guns, such as the Eastwood PCS-250 Dual-Voltage Powder Coating Gun (Eastwood #33728) or the Eastwood PCS-150 Single Voltage Powder Coating Gun (Eastwood #33272), can be tested by placing the ground clip approximately **1/4" to 1/2"** away from the emitter rod and momentarily depressing the power button. A bright blue spark with an audible "snap" will jump from emitter to clip; verifying power and ground is present.) **CAUTION: DO NOT** let the emitter rod come in direct contact with the ground clip or damage to the gun's power supply will result.



WARNING: HIGH VOLTAGE DANGER!
<u>Do Not</u> touch the ground clip or emitter during this test as it will cause a significant electrical shock!

- Poor or no ground. As the powder passes over the emitter rod, it picks up a high-voltage electrical charge. As the highly charged powder particles travel through the air, they're attracted directly to the metal parts which are grounded by being attached to the ground lead of the powder coating gun.
  - ✔ Check for good ground, making sure the ground wire from the gun isn't broken and no hooks or hanging apparatus are electrically insulating the part from completing the circuit. Use the testing procedure described in the step above **WITH EXTREME CARE** if required to verify a good ground. If in doubt, clamp the ground lead directly to the part if necessary.

The powder is only adhering to the part in certain areas and seems to be repelled in other areas. The more powder is delivered, the more it's repelled.

- This is the #1 enemy associated with powdercoating and is a result of a scientific phenomenon known as The Faraday Cage Effect. This condition is named after the English Scientist, Michal Faraday following his study of high voltage electricity in the 1830's. It occurs when a strong electromagnetic field is generated at an inside corner or a recess of a metal part.
  - ✔ To minimize or resolve the condition lower the gun voltage if it can be adjusted, or temporarily remove the ground from the part. Next, approach the offending area with the gun at a 90° angle or even parallel to the surface and let the powder fall into the repelling area by burping the powder/air trigger momentarily.
  - ✔ An alternative technique is to quickly lunge the gun toward the repelling area while applying powder, and then quickly withdraw the gun. In stubborn cases, it may be necessary to blow off all previously applied powder with compressed air and let the part rest for several hours, allowing the electromagnetic field to dissipate.
  - ✔ A faster resolution is to place the part in a pre-heated oven set at 400°F for no more than 5 minutes, remove and coat as normal. The exposure to heat will cause the electromagnetic field to dissipate and allow the powder to adhere. Set voltage to a lower setting (if that feature is available) and apply to the problem areas first, then quickly move to the remaining surfaces. The advanced Hot-Flocking method as outlined in Chapter 6 will also work quite well in typical Faraday-Cage situations.

- To avoid the Faraday-Cage effect in the future, learn to recognize some of areas it is likely to occur in and approach those areas with powder first while having the gun on a lower power setting (if so equipped) and pull back to a foot or more.
- As more experience is gained powdercoating, recognition of those potential Faraday-Cage problem areas is achieved as is the ability to work around it.

The powder comes out of the gun in huge clumps or clouds whenever the trigger is initially depressed, then flows smoothly:

- Most frequently, this is the result of pressure buildup at the air inlet of the powder gun, causing sudden pressure drops and spikes when opening and closing the trigger. This occurs with insufficient regulation.
  - ✔ In addition to a quality filter/regulator mounted at the compressor or appropriate location, use a true diaphragm-type regulator such as Eastwood's Filter Regulator #31834 or equivalent mounted right at the air inlet of the gun, set at the gun recommended pressure to deliver a constant pressure to the gun so that the powder will flow smoothly.
- The same issue can occur if the gun cup is overfilled.
  - ✔ Most powdercoating guns (including HotCoat) are designed to create swirling of air and generate fluidizing of the powder in the cup. Filling the cup too much will interfere with this process. Generally, adding powder to the 1/2 level in the cup is considered full. Check the powder gun instruction manual for proper fill level.

A large cloud of powder rushes out of the gun and right past the part when the trigger is depressed.

- This is generally caused by the pressure being set too high on the regulator, rushing through the gun, and ultimately wasting powder. Working in the 5-to 10-PSI range generally gives best application results. Always follow, and NEVER exceed, the manufacturer's pressure settings, or permanent gun damage can result.
  - ✔ Check to make sure the regulator is installed in the correct direction. An arrow symbol on the regulator indicates the direction of air flow.
- Too much powder may have been put into the gun cup, exceeding the fill level.
  - ✔ Most powdercoating guns (including HotCoat) are designed to create swirling of air and generate fluidizing of the powder in the cup. Filling the cup too much will interfere with this process. Generally, adding powder to the 1/2 level in the cup is considered full. Check the powder gun instruction manual for proper fill level.

Globs or chunks of powder are discharged out of the gun mixed with a normal cloud.

- This is a clear indication of moisture in the air supply or powder that has absorbed some atmospheric moisture from humidity.
  - ✔ Be sure the air supply is clean and dry by using a moisture trap or desiccant filter such as Eastwood's Mini Desiccant-Dryers #34146 or Disposable In-Line Air Filters #34066.
  - ✔ Check for moisture or clumping in the container of powder. Often, exposure to high humidity or temperature extremes can cause condensation or moisture contamination. Always store the powder in a cool (40°F to 85°F), dry environment, and only open the powder container briefly when powder coating in humid conditions. Powder with moisture clumping can usually be sifted out with a fine flour sifter available where kitchen items are sold. Be sure to do this in drier atmospheric conditions and the powder can be used without further problems.
- Too much powder may have been put into the gun cup, exceeding the fill level.
  - ✔ Most powdercoating guns (including HotCoat) are designed to create swirling of air and generate "fluidizing" of the powder in the cup. Filling the cup too much will interfere with this process. Generally, adding powder to 1/2 level in the cup is considered full. Check the powder gun instruction manual for proper fill level.

The powder was properly attracting to the parts, but powder gun performance seems to be degrading as the job progresses.

- Powder buildup at the gun nozzle and emitter rod.
  - ✔ Check for an accumulation of powder at the tip of the gun's metal emitter rod and remove it if present This can occur particularly when using powders with heavy metallic flake content gather into a clump around the emitter rod. **WARNING: HIGH VOLTAGE DANGER! Always unplug the gun from the power source before touching the emitter to avoid a significant electrical shock!**

The part is bumped or brushed, causing a portion of the freshly applied, uncured powder to be knocked off.

- The powder film is very fragile at this stage.
  - ✔ Any disturbed powder can be blown off a localized area of a larger part and re-applied to the area, but the safest method is to simply blow off all the powder from the part and start over.

8b. Flaws in The Cured Finish

Lumps or uneven powder surface.

- This is generally a result of too much powder having been applied to the part.
  - ✔ The surface can be wet-sanded smooth, beginning with 600 grit abrasive paper and working up to finer grits. Following that, it can be polished just the same as a painted finish.
- If some of a previous paint coating was not completely removed, it will be revealed by wrinkling up from the curing heat and causing lumps or i nclusions in the surface.
  - ✔ Unfortunately, the only remedy for this is to strip the powder and reapply it.
    - See Section 4A – Cleaning and Prepping Parts, Stripping.

Pock marks or small depressions in the finished surface.

- These are usually referred to by painters and powdercoaters as fisheyes. This condition is a result of particles of oily or silicone contamination left on the metal surface at the prep stage.
  - ✔ Although sometimes a thorough cleaning with Eastwood PRE Painting Prep #10041Z or acetone (followed by sanding the area, then recoating) may work, at this point it is best to strip the coating and start over.
    - See Chapter 4.
      - – Section 4A – Cleaning and Prepping Parts, Stripping.

Rough or sandy-appearing surface.

- If this occurred following when doing the Hot-Flocking process, this problem is usually a result of having too low of a surface temperature during the Hot Flock procedure which does not allow the powder to fully flow-out.
  - ✔ Sanding the roughness away with 600 grit abrasive paper and recoating will usually solve the issue provided a sufficient powder thickness exists.
- It can also occur when too little powder is applied during a standard room-temperature-and-cure application resulting in too thin of a film on the part.
  - ✔ Sanding the roughness away with 600 grit abrasive paper and recoating will usually solve the issue provided a sufficient powder thickness exists. If not, then stripping and recoating may be required.

Coating is thin and bare metal can be seen through it.

- This is a clear indication that the powder was applied too thinly.
  - ✔ Light sanding, although not required, can be helpful for maximum adhesion and smoothe finish. Apply another coat.

A haze or film is visible on a glossy, cured powder surface, particularly on black and dark colors.

- This is a thin film that can precipitate on a surface resulting from impurities in the oven. It tends to be most noticeable on larger, flat panels.
  - ✔ This can be minimized by keeping the oven clean interior clean and the floors free of spilled powder.

- This film can also be caused by using lower quality powders that have paraffin fillers which evaporate during the curing process and condense on the cured surface and oven interior. Always use good quality powder.
  - ✔ This can be removed by polishing the surface with a good quality, automotive paint polish or Powder Coat Polish (Eastwood #15862)

Eastwood Powder Coating & Paint Polish #15862

An uneven, textured or orange-peel finish surface especially with high gloss powders.

- This is actually a very common complaint which is generally caused by the heat expansion and contraction of larger sheet metal panels. It tends to be most noticeable on larger, flat panels. When hot, the metal panel has expanded and the powder film looks smooth and glossy however, as the metal panel cools, it will begin to quickly contract. The problem occurs because the cured powder film will contract at a slower rate than the metal and can begin to pick up a slight unevenness or texture. While this does not happen on all powdercoating projects, if exact conditions exist to create it; it can be difficult to avoid.
  - Orange Peel can also be caused by using lower quality powders which do not have the enhanced, flow out properties in their formulations that the better-quality powders do. Some also contain paraffin fillers. Avoid using lower quality powder.
    - ✔ Some controlled cooling by leaving the cured metal panel in the closed, turned-off oven and letting it cool down more slowly will help greatly to minimize the effect.
    - ✔ To remove orange peel texture, the cured powder surface can be wet-sanded smooth in exactly the same way a painted surface would be. Begin with 600-grit abrasive paper and work up to successively finer grits. This can be followed up with Powder Coat Polish (Eastwood #15862)

Raised bubbles in the powder surface.

- This usually occurs on a cast piece and is caused by oil, grease or other impurities embedded in the microscopic pores in the cast metal, cooking in the heat of the cure cycle and releasing gasses which become trapped under the powder film then creating bubbles.
  - ✔ Unfortunately, the only remedy for this is to strip the powder off and redo the process.
    - See Chapter 4.
      - – Section 4A – Cleaning and Prepping Parts, Stripping.

NOTE: Keep in mind that some chrome-plated parts, such as hood ornaments, trim pieces, taillight bezels etc., may be made of a poor-quality, porous, die-cast pot metal which will always outgas when baked, even causing bubbles under chrome plating. This cannot be avoided with this type of metal.

The powder finish has a darkened, browned or burned appearance.

- Darkening of the powder color is actually a darkening of the powder's color pigments and generally describes a burned coating resulting from exposure to too high of a curing temperature. This begins to occur at about 450°F - 500°F and most noticeable with clears, whites and lighter colors. Darker colors and black generally are not affected. (This can also happen of the coating is exposed to higher temperatures while in service).
  - ✔ Generally, although the color appearance is affected, the integrity of the powder film will not be compromised as powder finishes can be exposed to temperatures up to 600°F without destroying the film although the burned appearance is permanent. At this point, a powder finish can be roughed up with 600 grit abrasive and re-coated.
  - ✔ Temperature exposure beyond 650°F - 700°F will destroy the coating film, requiring stripping and recoating.

A muddy, dull grayish appearance when applying a clear over a chrome powder or when applying translucent colors over a silver or gold base.

- This is the result of an incomplete cure of the base chrome or silver base coat, and the two coats melting or blending together.
- To avoid this in the future, always make sure when using a base coat that a full temperature and time cure is achieved.
  - ✔ Unfortunately, the entire coating needs to be stripped fully, the part cleaned and recoated.
  - ✔ It is vitally important as with any coating, that before applying powder, the surface is completely clean and free of any old coatings, grease, dirt or other contaminates.
  - ✔ Also, always make sure that a full temperature and time cure is achieved.

Cracks appear in a clear or translucent powder after application over a chrome powder or silver or gold base.

- This is caused by an incomplete cure of the base coat and/or the clear or translucent.
  - ✔ Unfortunately, the entire coating needs to be stripped fully, the part cleaned and recoated. Always make sure when using a base and topcoat, that a full temperature and time cure is achieved.
    - See Chapter 4.
      - – Section 4A – Cleaning and Prepping Parts, Stripping.

The powder film is easily chipped in use.

- This occurs when the powder was incompletely cured at too low a temperature or for too short a time. Always make sure that a full temperature and time is achieved.
  - ✔ Unfortunately, the entire coating needs to be stripped fully, the part cleaned and recoated.
    - See Chapter 4.
      - – Section 4A – Cleaning and Prepping Parts, Stripping.

The powder film fails by peeling or flaking after extended periods of time outdoors.

- This is caused by improper surface preparation and/or incomplete cure.
  - ✔ Unfortunately, the part must be stripped and re-coated.
    - See Chapter 4.
      - – Section 4A – Cleaning and Prepping Parts, Stripping.
- It is vitally important that before applying powder, the surface is completely clean and free of any old coatings, grease, dirt or other contaminates.
- Also, always make sure that a full temperature and time cure is achieved.

9. FREQUENTLY ASKED QUESTIONS.

The following is a comprehensive list of the most asked questions among beginning and moderately experienced powdercoaters:

- **What is the expected coverage of powder compared to paint?**
  This is highly variable depending on many factors including the type of surface, density of the powder formulation, thickness of application and more making it very difficult to offer an accurate generalization.
  - For a real-world example: Consider that one 1/2 lb. bottle of Eastwood #10138 Chevy Orange/Vermillion Powder properly applied, will more than adequately coat 2 sets of steel Chevrolet 350 V8 valve covers while approximately 3 cans of aerosol paint would be required for the same items.

- **Is a basecoat of powder needed?**
  No.
  - A basecoat is not required except for special effects powders.
  - All standard powdercoating powders are formulated to be applied as a single coat only. This is especially true with Eastwood HotCoat Powders.
  - The formulations are fully opaque and when applied in a normal thickness, will completely hide the metal surface being coated. The application of a lighter or darker color is not required and will not affect the final color.
  - The only exception is when using translucent colors and certain special effects metallics and pearls that are transparent or semi-transparent. These will require a reflective or specific basecoat. Any need for a basecoat will be specified in the product description and individual powder instructions.

- **Can I powdercoat over chrome?**
  Yes.
  - Generally, if the chrome is on steel parts such as bumpers, brackets, housings etc., no special prep is needed other than a thorough cleaning with Eastwood PRE Painting Prep #10041Z or acetone. Roughening the chrome surface with 600 grit abrasive paper is helpful for chip and scratch resistance but not necessary.

- Be aware that some chrome-plated parts such as hood ornaments, trim pieces, etc. may be made of a poor-quality, porous, die-cast pot metal which will always outgas when baked, even causing bubbles under the existing chrome-plating when exposed to heat.
- This subject is covered in greater detail in Chapter 6.

- **How do I apply clear powder over another powder color?**
  - If it is done soon after the 1st coat is applied, simply apply the clear over a properly grounded and cooled part.
  - The advanced technique of hot flocking where the clear is applied over a hot previously coated part. This is covered in detail in Chapter 6 under the heading Hot Flocking.
  - If the clear is being applied over an older powder coated finish, it should be sanded with 600 grit abrasive paper and cleaned thoroughly with Eastwood PRE Painting Prep #10041Z or acetone.
  - Powdercoating does not electrically conduct and will insulate from grounding. Provide an area on the part for good grounding.

Eastwood Powder Coating & Paint Polish #15862

- **Can I cut and buff a powdercoated surface?**

  Yes.
  - Powdercoat can be treated exactly like a painted surface. It can be wet-sanded, polished with a buffer and waxed. Just remember that since it is generally much tougher than most paints, it may require more effort.
  - Eastwood offers a special Powder Coat Polish, #15862, for that purpose.

- **Can I apply lettering or pinstriping paint over a powdercoated surface?**

  Yes.
  - The powdercoated surface must be cleaned exactly as it would for any painted finish.

- **Can I apply vinyl graphics, wraps, decals or stickers over a powdercoated surface?**

  Yes.

  – The powdercoated surface must be cleaned exactly as it would for any painted finish.

- **Can paint be applied over powdercoat?**

  Yes.

  – To paint over powdercoating, just treat it the same as paint by thoroughly sanding with 600 grit abrasive for adhesion.

- **Can a scratched, chipped or damaged powdercoated surface be repaired?**

  Yes.

  If stripping and re-coating is not possible, several options exist:

  – First, try to find a paint that is close to the powder color and touch it up with a fine brush as with paint.

  – Secondly, obtain some MEK (Methyl Ethyl Ketone) at a local Home Supply or Plumbing store. Be sure to follow all cautions on the container for handling as it is a harsh chemical. Add a small amount of the matching powder in a metal container and mix a few drops of MEK into it. This will dissolve the powder turning it into a liquid.
    At this point a fine brush can be used to apply the softened powder to the damaged area. Using a heat gun, heat the repaired area to cure the powder. An Infrared Thermometer is highly recommended to monitor the surface temperature and maintain a 400°F cure temperature for about 10 minutes. The area can then be wet sanded then polished to blend the repair.

- **Can powder colors be mixed to create other colors?**

  Example: red and yellow to make orange, blue and green to make aqua etc.

  Yes, with limitations:

  – Because powder is very finely ground solid particles, it will never mix. Attempting to blend solid colors will result in a speckled appearance between the two colors when viewed closely. This effect is similar to the printing of color newspaper or comic book photos or illustrations. It is noticeable up close but not from a foot or more away.

  – With translucent powders, this effect is less noticeable and can be accomplished without detection, producing excellent results.

- **How thick is a powdercoated finish?**
  - Normally, a room temperature powdercoat film is 1 to 3 mils (0.001" to 0.003"). Hot-Flocking (Chapter 7) can produce a film thickness of 3 to 5 mils (0.003" to 0.005") or more depending on the number of coats and the density of the powder used.

- **How high of a temperature can cured powdercoating withstand?**

  This requires a multi-part response.
  - A good quality powdercoated film will be able to withstand temperature exposure to 500°F without harming the integrity of the coating but the color pigments unfortunately, will not and the color will darken. Therefore, parts like motorcycle cylinders and engine blocks can be powdercoated black without issue.
  - Occasional, *short peaks* of exposure to 600°F will not adversely affect the integrity of the coating but will turn a darker brown. Longer temperature exposure beyond 600°F will begin to break down and destroy the powder film.

- **Can wood be powdercoated?**

  Yes, with limitations.
  - Wood can be Hot-Flocked (See Chapter 7) cautiously although some pieces my shrink and or split when exposed to oven temperatures.
  - Older, drier wood has a much less likelihood of splitting and shrinking than newer, "greener" wood.
  - Hardwoods are more receptive to receiving powder than softer woods are.

- **Can glass or ceramics be powdercoated?**

  Yes.
  - BUT, since it cannot hold an electrostatic charge, it can only be pre-heated and "Hot Flocked". See Chapter 7, Hot Flocking Powdercoating.

- **Can fiberglass be powdercoated?**

  No, not recommended.
  - If the particular resin used in the manufacture of the piece is known and is formulated to withstand 400°F temperatures, then yes, it could be Hot-Flocked (Chapter 7) otherwise the cure heat will destroy the fiberglass piece.

- **Are there powders for High Temperature use?**

  Yes, but be aware of silicone contamination.

  - There are some commercially available powders that when cured at 400°F, will regularly withstand 750°F to 1,100°F however they can be very difficult to store as they are highly susceptible to heat and solidifying while in storage in their uncured state and their high silicone content can contaminate the powdercoating gun used to apply them. Minute traces of silicone left in a powdercoating gun can cause fish-eyes in a standard powder finish if applied through the same gun.
  - If using high-temp powders, to avoid contamination, it is strongly recommended to use a dedicated powdercoating gun just for those powders.

- **Can swept up or waste powder be reused?**

  No! This is not recommended.

  - Because picking up dust, dirt and other impurities would produce a bad finish, powder cannot be swept up and re-used.
  - By design, powdercoating with the electrostatic attraction, is highly efficient. With practice, powder application techniques will allow the user to become very good at reducing the amount of wasted powder that would blow past a part and fall to the floor.
  - There are commercial powder reclamation booths available however, they are quite expensive and suited for high production work, using the same color.

10. ADVANCED EQUIPMENT NEEDED TO GO TO THE NEXT LEVEL

As you progress from a beginner to seasoned, advanced powder coater, you may want to acquire some additional equipment that will enable you to transition your powdercoating hobby into a highly profitable and satisfying business. We will cover what the common requirements are, what equipment will serve those needs and why.

Parts Cleaning/Abrasive Blasting

As experience is gained, it becomes readily apparent that starting with clean, prepared parts makes powdercoating a whole lot easier. Professionals in the powder coating business, however, realize that the parts that customers bring in are rarely fully prepped and ready to go. When this happens, you can simply insist that parts can only be brought in cleaned, prepped and ready to go. Unfortunately, that response will almost always result in lost business. The solution is to set up the shop with a good quality parts washer to degrease grimy mechanical parts that make up the majority of customer's projects. Be sure it has an adequate cleaner volume and weight capacity to handle virtually any underhood, driveline, brake suspension or chassis part that may need to fit.

Eastwood Abrasive Media Blast Cabinet #21301

Eastwood 100lb Pressure Abrasive Blaster #51118

The next item that is a necessary piece of equipment in any commercial shop and will be subjected to a lot of use, is an abrasive blasting cabinet. It will require an internal volume capacity capable of accepting larger items such as wheels, bumpers, transmission cases, suspension, chassis parts and possibly even motorcycle frames.

Another abrasive blasting alternative that does not have space constraints is a Pressure Blaster set up in a dedicated room or outdoor area. With these, personal safety and health, dust containment and cleanup become more of a concern.

Air Compressor, lines and air handling

To power the large blast cabinet described previously, an air compressor must be capable of providing enough CFM (Cubic Feet per Minute) to support the rigorous demands of commercial use. CFM is the major selection criteria that should be used when choosing an air compressor as it is a measure of the total air flow that is required to adequately power various compressed air operated devices. At this point, motor horsepower and tank capacity are secondary factors and shouldn't be used as the main selection variables.

Eastwood Elite QST 30/60 Scroll Air Compressor #32220

A commercial type, two stage compressors with 35 to 50 or even more CFM capability should be considered as a very minimum.
Keep in mind that voltage and phase will also be important considerations as some larger capacity compressors will also require 3 phase electrical service but more on that in a bit.
Adequate compressed air piping and lines need to be a consideration as well.
A large capacity moisture separator will be needed as moisture in compressed air is the greatest enemy of powdercoating and abrasive blasting. This is most critical in areas where high humidity is prevalent.

Eastwood Elite QST 80/120 Scroll Air Compressor #32500

Rapid Air 3/4" MAXLINE Master Kit 300 FT #55267

Powder Coating Oven

For those planning on making powdercoating a viable business, it becomes quite clear that an old electric kitchen oven that served so well in supporting the needs of a powdercoating hobbyist simply will not work in a business environment. The considerations are obviously the size of parts to be cured and the frequency of use. Many professional powdercoaters will batch their work, so that once the oven is brought up to temperature, it will be kept there and used for a number of powdercoating "batches". This tends to streamline the operation and saves on utility costs.

Eastwood Abrasive Blaster Moisture Separator #34103

As far as size is concerned, consider that when powdercoating wheels, they are almost always done as a set of four, possibly five, so internal dimensions that will accommodate the number of wheels and a supporting rack becomes important.

A good plan is to consider the largest parts likely to be done and go from there.

Eastwood Hotcoat Powder Coating Rack Kit #33912

If powdercoating motorcycle frames and automotive rear axle housings are possibilities, an oven with internal dimensions of 4' x 4' x 6' would be advisable.

Another consideration is that commercial powdercoating ovens are specifically designed with internal circulating fans and non-draft baffles to prevent temperature stratification which can vary as much as 50°F between the upper area and floor of a larger oven.

As with many commercial compressors, such as an Eastwood #32500 80/120 Scroll Compressor, some commercial ovens operate on 3 phase electrical power. Running 3 phase to a building not equipped for it can be a very expensive proposition, so Eastwood offers commercial powdercoating ovens that operate on more readily available 220 Volt power sources.

Eastwood HotCoat 4x4x6 120 Volt Powder Coating Booth #33276

Powder Coating Booths

As the volume of work that a successful business will create increases, a suitable place to control the amount (although minimal) of excess powder that will be released into the workplace air is necessary. This becomes an issue as the powder tends to settle out of the air and accumulate on every horizontal surface in the shop making cleanup a real concern.

Spray Booths specifically designed for powdercoating incorporate explosion-proof fans and filtration systems that allow the release of filtered air directly back into the shop and do not require costly venting to the outside. Again, as with the powdercoating ovens, size is a major concern when making the wisest choice at purchase time.

Eastwood HotCoat 4x4x6 120 Volt Powder Coating Booth #33276

Powder Coating Guns

The Eastwood PCS-250 Dual-Voltage Powder Coating System® is an excellent all-around unit for use for hobby and commercial shops due to its rugged simplicity, high efficiency, and low cost. In fact, many professional powdercoating shops will have several on hand that they use interchangeably for smaller jobs with some fully dedicated to frequently used colors. For example, a gun used exclusively for use with gloss black powder can save time in a production environment by not requiring clean-up for color changes.

Eastwood PCS-250 Dual Voltage Powder Gun #33278

Eastwood Elite HotCoat PCS-1000 Powder Coating System #16164

- There are also numerous, high-voltage professional powdercoating guns and systems on the market. These are generally available as a complete system. An excellent choice for a commercial powdercoating shop is the 100Kv, Eastwood Elite HotCoat PCS-1000 System®.

Electrical Service

As mentioned in the paragraphs above, 3 Phase commercial electrical power may offer advantages for a commercial shop. However, it can be very costly to supply the power to a location not already serviced. Choosing a shop location that has an existing 3 Phase electrical service is another alternative.

3 Phase costs and availability can vary widely based on a specific geographic location. Always consult the local electrical power utility company for further information as they are best equipped to advise with power source selection on a regional basis.

Grounding

This subject has been addressed elsewhere in this book however it is such an important factor in successful powdercoating that it bears repeating. In setting up for a business, this becomes a necessity not an option.

Home center stores all sell Ground Rods. They are 6' - 8' in length and designed to be driven into the ground outside your garage or shop. Also purchase Rod Clamps and a sufficiently long roll of 10-gauge wire.

- Drive the rod into the ground (Helpful Tip: drive it in on slight angle, about 20° This will aid in driving completely into ground deflecting around rocks or obstructions and not into them).
- Attach the 10-gauge wire to the Ground Rod with the Rod Clamps.
- Run the 10-gauge ground wire into the shop and connect the opposite end directly to the parts hanging rack or powder application booth.
- This will provide a solid and sure ground connection.

One Final Note

The folks at Eastwood are always ready and willing to assist in offering suggestions and cost information on a wide array of Powder Coating Ovens, Booths, Compressors and Abrasive Blasting equipment. Just contact them for help in selecting equipment or to answer any technical questions that might arise.

11. GLOSSARY OF POWDER COATING TERMINOLOGY:

- **Abrasive Blasting:** Using a hard particulate, abrasive material under pressure to remove rust, impurities, and previous coatings from a substrate. May be done with a free-standing pressure vessel or contained within a specialized cabinet

- **Back Ionization:** An excessive build up of charged powder particles which may limit further powder being deposited on the substrate. The electrical charge on the surface layer may be reversed, repelling additional powder (also known as Faraday cage effect).

- **Bulk Density:** Mass per unit of volume in powder form including the air trapped between particles. Example: Notice how a ½ lb of a white or clear powder will fill a container to a higher level than a denser red or orange.

- **Corona Charge:** The process of inducing a static electric charge on powder particles by passing the powder through an electrostatic field generated by a high voltage device.

- **Cure Schedule:** The time/temperature relationship required to properly cross-link a powder coating film.

- **Delivery:** The process of moving the powder through the application equipment to the end product.

- **Edge Coverage:** A powder's ability to flow over, build and adhere to sharp corners, angles and edges.

- **Electrostatic Spray Technique:** A deposition method of spraying and charging powder so that it is deposited on a grounded substrate. (See Corona charging and Tribo charging.)

- **Emitter Rod:** A component of Powder Coating guns that transfer the high-voltage, electrostatic charge to powder passing over it.

- **Faraday Cage Effect:** A condition that may exist on a substrate due to its geometric configuration that may inhibit the electrostatic deposition of powder particles at a specific localized area. See Back Ionization.

- **Film Formation:** The forming of a continuous film by melting powder particles and fusing them together by the application of energy.

- **Fluidizing:** The process of suspending the powder in a continuous stream of air giving it "fluid like" characteristics. Used to facilitate transfer of the powder to the application device. Generally inherent in the design of a powder coating gun.

- **Fusion:** The melting and flow of individual powder particles when heated to form a continuous film.

- **Grounding:** The electrical grounding of the item to be coated, completing the electrostatic circuit.

- **Micron/Mils:** Common unit of measurement of coating thickness. 25.4µ (microns or micrometers) = 1 mil (one thousandth of an inch).

- **Particle Size:** Average diameter of an individual, irregular powder particle.

- **Reclaimed Powder:** Powder discharged but not deposited on an object. Generally captured in a powder spray booth and re-used.

- **Recovery:** The process of removing non-deposited powder from the air prior to reclaiming it for reuse.

- **Spray Booth:** A specially designed enclosure in which powders are introduced, contained, and recovered during the coating process.

- **Surface Appearance:** Generally, refers to the smoothness and gloss of powder coating films and the presence and degree of surface defects.

- **System Utilization or System Efficiency:** The combined efficiencies of each component in the powder coating system resulting in total material usage compared to the amount of material entered into the system.

- **Transfer Efficiency:** The ratio of the powder deposited on the workpiece compared to the amount of powder sprayed during a fixed time period.

- **Tribo Charging:** Process of creating a static electrical charge on powder particles by creating friction between them and a nonconductive material.

- **Virgin Powder:** Powder that has not been previously sprayed as opposed to reclaimed powder.

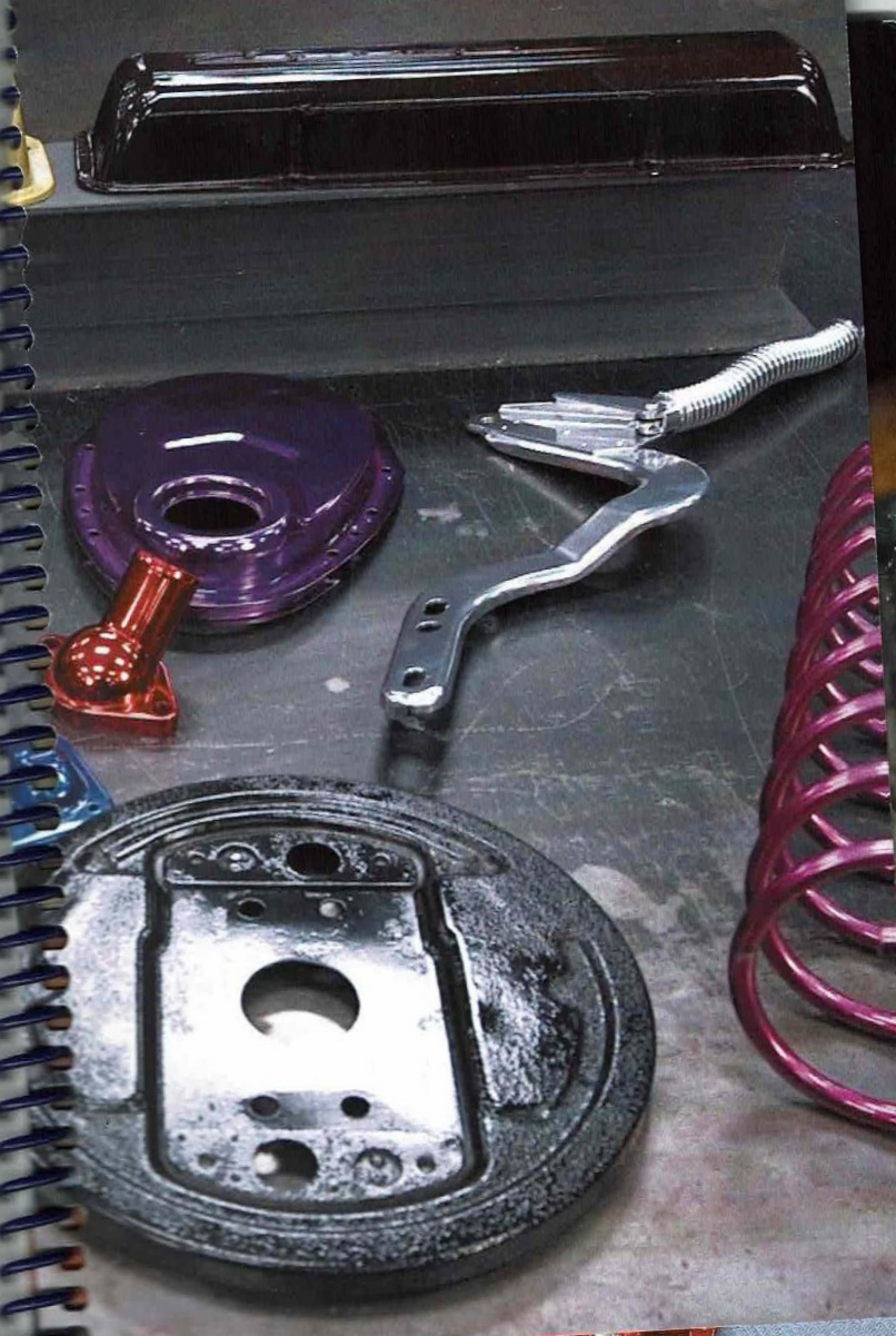
- **Wrap:** A characteristic of electrostatic application for the powder to seek out and adhere to parts of the substrate not in direct line of sight of the delivery point.

12. MISCELLANEOUS ITEMS FOR IMPROVED POWDERCOATING

The following is a list of suggested items that while not required, will make powdercoating easier go a long way toward creating a perfect powdercoating job.

- A dedicated spoon or funnel for transferring powder from supplying container to the Powder Gun Cup.
- A commonly available kitchen flour sifter to crumble minor powder clumps.
- An inexpensive kitchen timer.
- A kitchen oven thermometer.
- Non-Contact Infrared Thermometer (Eastwood # 31233).
- A roll of aluminum foil for heat-resistant masking use.
- A roll of High-Temperature Masking Tape (Eastwood # 16315 16319 & 16321) to mask threads, machined surfaces other areas where powder build is not desired. (See Masking the Part).
- High-Temperature Silicone Plugs and Caps (Eastwood # 58041) to seal threaded holes and close tolerance openings. These plugs also work great as "legs" to support parts in the oven during curing.
- Precision "Exacto®" type of hobby knife.
- A small 1-0 hobby or artists brush.
- A spool of Stainless-Steel Wire (Eastwood # 43045) to hold parts while powder coating and curing. (Always use a clean piece of wire to guarantee a complete ground).
- Large wire type Paper Clips. (When opened to an "S" configuration make excellent hooks).
- Clean cotton rags or lint free paper towels.
- A Filter/Regulator (Eastwood # 31633). It must be maintained if used daily.
- A Dust Mask.
- Goggles.
- Nitrile Gloves for handling powder.
- A pair of leather heat-resistant gloves (Eastwood # 21294) for use in placing powder coated items into and removing from a hot oven.
- A quick disconnect air coupler set (Rockwood # 31521).

NOTES:



"I have been in the custom powder coating business for over thirteen years, and if I only had this guide at my disposal back then, my learning curve would have been dramatically different!

This guide covers a multitude of powder coating applications and problem solving scenarios, as comprehensively explained by Eastwood's resident powder coating expert, Joe Richardson.

It's a must-have for the beginner DIY enthusiast and pro-level powder coaters looking to brush up on their techniques."

Dan Woods, Owner
D&W Motorsports
Custom Powder Coating

"I have been involved with powder coating since Eastwood Company's introduction of their Hot Coat Systems in 1997. I am truly amazed at the products and the services that Eastwood offers. This guide is no different.

After reviewing it, I find it to be an exceptional resource that provides detailed and comprehensive information in layman's terms.

I am especially impressed with the guide's easy reference of common problems and cures with powder coating, many of which I have personally experienced from lessons learned over many, many years.

I strongly recommend and endorse this powder coating guide, as it is truly a valuable resource for any novice or experienced powder coater!"

Bob Zarrilli, Proprietor
RiMZCoat Powder Coating
& Abrasive Blasting Specialists

Item #14104 3/22 Rev 3

Eastwood

DO THE JOB RIGHT.

263 Shoemaker Road, Pottstown, PA 19464, USA
US and Canada: 800.343.9353 eastwood.com
© Copyright 2022 Eastwood Automotive Group LLC